UPS, PDU, RPP Submittal

Project:

Park Center Building A

Submitted by:
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Park Center Building A Bill of Materials

Qty	Description

UPS

Qty	Description
1	Eaton Power Xpert 9395-825 Model 825kVA N+1 UPS *Output Rating: 825kVA (750kW at .91 lagging pf) N+1* *UPM Complement: (4) 275kVA/250kW UPM's* *Input Voltage: 480VAC, 3 phase, 4 wire or 5-wire, Dual Feed* *Output Voltage: 480VAC, 3 phase, 4 wire or 5-wire* *Heat Rejection: 160,832 Btu/Hr* *Interruption Capacity: 100kAIC* *Max. Feeder Bkr: 1600A (80% Rated)* *Module Dimensions: 170" Wide, 32.7" Deep, 73.7" High* *Module Weight: 6,365 Pounds* *Embedded Startup: 5x8 included* *Embedded Warranty: Full 1-Year including parts, labor, and expenses*
1	Eaton Power Xpert UPS Communication Card *Communication Protocols: SNMP, Web, ModBus-TCP/IP* *Compatibility: X-Slot*
1	Eaton Industrial Relay Card-XSlot *Communication Protocols: Dry Contact (Form-C up to 5A @ 250V)* *Compatibility: X-Slot* *Outputs: Utility Failure, Low Battery, UPS OK/Summary Alarm, and On Bypass*
1	Eaton HOT-Sync CAN Communication Card *Communication Protocol: Powerware UPS* *Compatibility: X-Slot*
1	Environmental Monitoring Probe *Monitored Parameters: Ambient Temperature and Humidity* *Communication Protocols: Web* *Compatibility: PowerXpert Card or ConnectUPS Web Card Only*
1	B-Tech Smoke Detector *120 Volt Electrical Smoke Detector* *Built In Relay* *Ionization Technology* *Alarm And Power Test Button* *Operating LED Light* *Multi-Alarm Interconnection* *Alarm Source Indicator*
1	Eaton Remote Monitor Panel *Provides backlit status indicators and a local horn for the following conditions:* *System Normal* *UPS Alarm* *On Battery* *On Generator* *On Bypass* *Bypass Unavailable* *No Redundancy* *Shutdown Imminent*
1	Eaton Power Xpert 9395-825kVA Base Cover Kit *Provides base-plate covers for forklift handling points.* *Includes black button-head cap mounting screws.*
1	Eaton Power Xpert 9395-825kVA (4-UPM) 2010 CBC Seismic Bracket *2010 California Building Code Compliant anchoring bracket.*
1	Eaton 9395 UPM Spares Level "D" *UPM Voltage: 400VAC or 480VAC* *Includes 20% Spares (Fuses & Fans)*
1	Eaton 9395-825 ISBM Spares Level "D" *ISBM Voltage: 480VAC* *Includes 20% Spares (Fuses & Fans)*

Qty	Description
1	Eaton Power Xpert 9395 Certified Factory Test Data *Includes factory engineer certified written report from standard manufacturer factory test procedure.*
1	Cutler Hammer 1200A Maintenance Bypass Panel *Current Capacity: 1200A* *Interruption Capacity: 100kAIC* *Configuration: 2-Breaker (MIS, MBP)* *Trips: DigiTrip 310+ LS* *Interlock: Electrical & Kirk Key with SKRU* *Aux Contacts: 2A/2B* *Features: (1) 1200AF/1000AT Load Bank Breaker* *MBP Dimensions: 45" Wide, 24" Deep, 90" High* *MBP Weight: 1200 Pounds*
1	Enersys 16HX550 VRLA Battery Module *Link Voltage: 480VDC* *Cabinets per UPS (4) at 32" Wide and 5,310 Pounds Each* *Total Runtime: 6 minutes at 825kVA load* *Disconnect: 600A DC Breaker internal to cabinet* *Battery Module Dim: 128" Wide, 31.5" Deep, 84" High* *Battery Module Weight: 21,240 Pounds* *Note: DC cabling from cabinet to UPS or external disconnect provided by others.*
1	Eaton Flex UPS Service Plan Year 2 *Emergency Coverage: 7x24* *On-Site Response Time: 8-Hours* *Total Service Coverage Duration: 2-Years from startup*
1	Eaton Cellwatch Battery Monitoring System *Provides detailed battery health report to individual cell level.* *Installation: Included during normal working hours, M-F 8am-5pm.* *Installation does not include wall penetrations, conduit, or 120VAC protected power.*
1	Eaton Power Xpert 9395 Factory Witness Testing *Customer witnessed UPS factory testing.* *Manufacturer's standard procedure only.* *Includes food, travel, & lodging for (1) representative.* *Performed during normal working hours. M-F 8am-5pm.*
1	Custom Site Load Test *Site load testing performed with Resistive Load Bank with 100' Cable* *Includes 30 minute functional test followed by 3.5 hour burn-in* *Test performed during normal working hours only.*
1	Technician Laptop *To be stored at site.*
1	Freight to VA/DC/MD *Dock to dock*
1	FOB Destination *Legal ownership of equipment to take place at freight destination.*

PDU's & RPP's

Qty	Description
2	Powerware 50kVA Power Distribution Unit *Transformer Rating: 50kVA, k20, 150°C Rise, TP1* *Cable Entry/Exit: Top or Bottom* *Distribution: (6) 60A Subfeed Breakers* *Monitoring: Eaton Subfeed Circuit Monitoring* *Communications: Power Xpert Gateway Card (SNMP, ModBus, TCP/IP)* *Features: Air Skirt* *Heat Rejection: 6,892 Btu/Hr* *PDU Dimensions: 39" Wide, 35" Deep, 80" High* *PDU Weight: ~1,864 Pounds* *Embedded Warranty/Service Plan: Full 1-Year including parts, labor, and expenses*

Qty	Description
2	Powerware 150kVA Power Distribution Unit *Transformer Rating: 150kVA, k20, 150°C Rise, TP1* *Cable Entry/Exit: Top or Bottom* *Distribution: (4) 225A Subfeed Breakers* *Monitoring: Eaton Subfeed Circuit Monitoring* *Communications: Power Xpert Gateway Card (SNMP, ModBus, TCP/IP)* *Features: Air Skirt* *Heat Rejection: 18,460 Btu/Hr* *PDU Dimensions: 39" Wide, 35" Deep, 80" High* *PDU Weight: 2,782 Pounds* *Embedded Warranty/Service Plan: Full 1-Year including parts, labor, and expenses*
6	Powerware Remote Power Panel *Number of Inputs: (2) via Main Input Lugs (450A)* *Cable Entry/Exit: Top or Bottom* *Panelboard Type: 42-Pole Cutler Hammer with 225A Main Breaker (80% Rated, 35kAIC)* *Panelboard Qty: (2) Front, (2) Rear* *Branch Circuit Breakers: (5) 2P30A 10kAIC per side* *RPP Dimensions: 24" Wide, 24" Deep, 80" High* *RPP Weight: ~900 Pounds*
4	FieldServer PDU ModBus - BACnet Converter *Transfers ModBus input values to BACnet protocol*
4	Powerware PDU Certified Factory Test Data *Includes factory engineer certified written report from standard manufacturer factory test procedure.*
1	Powerware PDU & RPP Startup 7x24 *Includes startup for (4) PDU's and (6) RPP's* *Performed by factory trained technician during overtime (non weekend) hours (M-F 5pm -8am).*
1	Freight to VA/DC/MD *Dock to dock, FOB factory*
1	FOB Destination *Legal ownership of equipment to take place at freight destination.*

Specification Notes:

Proposal is based on Eaton's standard offering for UPS's in conjunction with the following project documents and with comments as outlined below.
- Specification 262600 dated 12/10/13
- Specification 263353 dated 02/13/14
- Drawing E1.101 dated 02/13/14

262600-1.5.C - PDU's and RPP's are not seismic certified.

262600-2.1.B - Sound level tests results will be provided from sample production units. Sound level testing will not be conducted on actual project equpment.

262600-3.3.D - PDU's will be tested to manufacturer's standard procedures in lieu of NETA prodecures.

262600-3.3.F - IR Scanning will not be performed.

263353-2.2.L - The unit shall operate with up to 110% of resistive/inductive load for 10 minutes, up to 125% for 30 seconds, and up to 150% for 10 seconds.

263353-2.3.G - UPS is non-upgradeable.

263353-2.10 - Proposed UPS does not include output distribution section.

263353-2.16.B - Factory witness testing and travel for (1) owner's representative is included in base price.

263353-3.6.D.3 - Equipment will be inspected to manufacturer's standard procedure only.

263353-3.6.D.6 - Site testing will be conducted using a resistive load bank and to manufacturer's standard procedure.

263353-3.6.E - Seismic restraint testing is responsibility of others.

263353-3.7 - 10 day performance testing is responsibility of others.

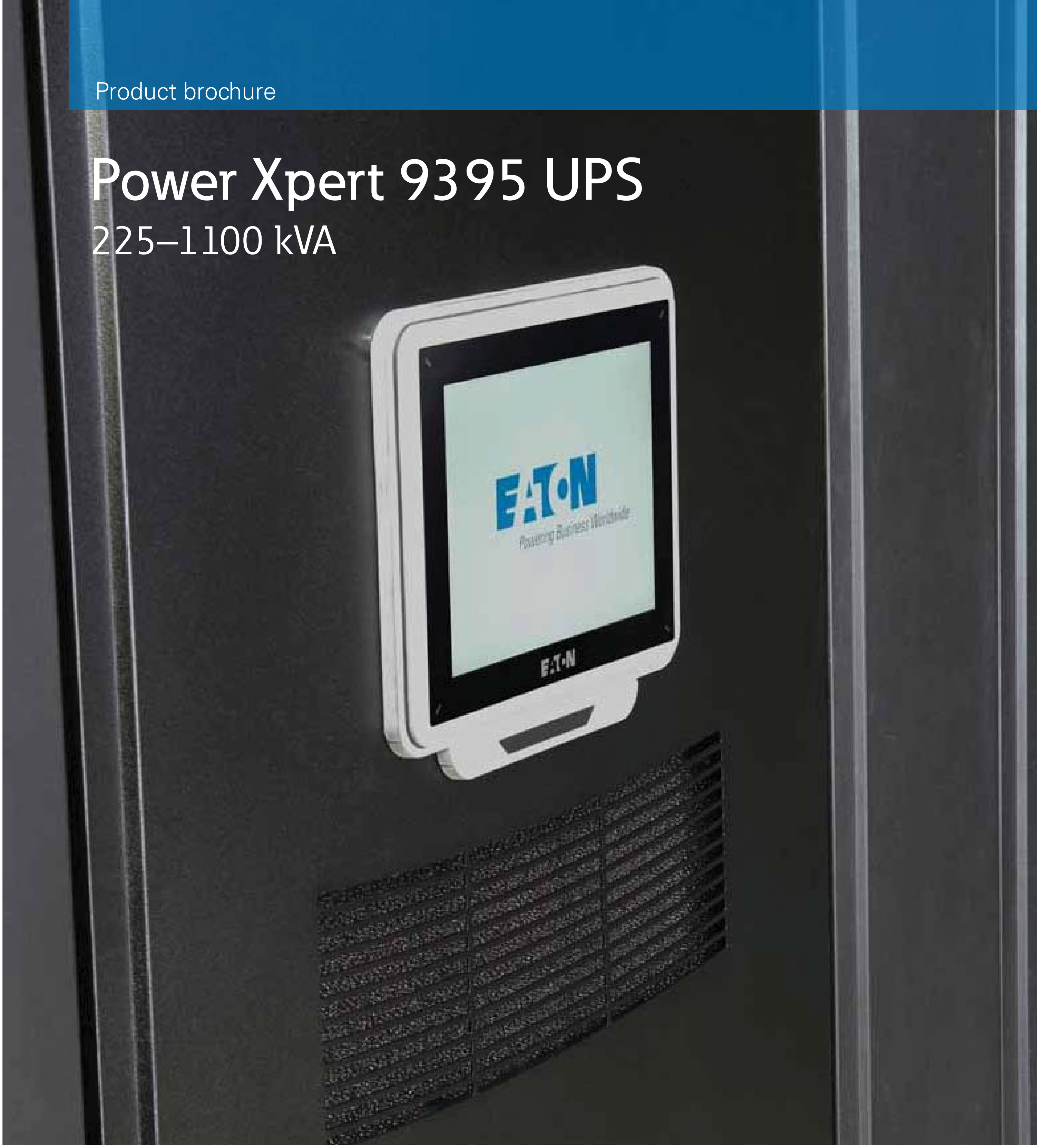
UPS

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Product brochure

Power Xpert 9395 UPS

225–1100 kVA



Powering Business Worldwide

An Eaton Green Product

Introduction and overview

For more than 40 years, Eaton® has been dedicated to delivering the most technologically advanced products for our customers' mission-critical applications—a commitment exemplified by the Power Xpert™ 9395 UPS. With an unprecedented level of power performance, reliability and energy savings, the state-of-the-art 9395 has raised the bar in three-phase power protection technology.

The 9395 delivers a wide scope of superior customer-driven benefits unmatched by competitive UPS solutions, including:

Leading sustainability

- Highest efficiency ratings lower utility costs
- Lowest total cost of ownership and lifecycle carbon footprint
- Smallest footprint and weight
- Lowest transportation and installation costs

Stronger power performance

- Lowest input to THD enhance compatibility with upstream power systems
- Lowest output THD
- Optimum generator sizing
- PFC power supply compatible

Highest reliability and availability

- Powerware Hot Sync® wireless paralleling
- Superior battery management
- Inherent redundancy
- Scalable architecture that adapts to increasing power requirements

Robust manageability

- Superior control and connectivity
- 10-inch color touchscreen display provides metering and management options

Key applications

- Large data centers
- Colocation facilities
- Server farms
- Telecommunication installations
- Internet service providers
- Transportation systems
- Security operations
- Broadcasting and entertainment
- Process control equipment
- Financial systems
- Credit card operations
- Healthcare
- Industrial systems
- Multiple medical imaging units

The reliable solution

Providing high availability for your critical systems at all times, the 9395 was designed with numerous technological advancements that create an unprecedented level of reliability while emphasizing serviceability–lowering MTTR and enhancing availability.

Double-conversion design offers the highest protection possible

Unlike some other commercially available UPS technologies, the double-conversion design completely isolates output power from all input power anomalies and delivers 100-percent conditioned, perfect sine-wave output—regulating both voltage and frequency. Even when presented with the most severe power disturbances, power output remains stable. Output voltage THD is held within two percent of nominal specification for linear loads, and within five percent for nonlinear loads—making the 9395 ideal for supporting equipment that's sensitive to a distorted voltage input. Additionally, the 9395 excels at supporting leading power factor loads, which are becoming more prevalent in new or updated data centers. The 9395 handles leading loads, down to 0.9 power factor, without de-rating.

Inherent redundancy option

Surveys focused on efficiency in data centers reveal that UPSs are often under-loaded–frequently at less than 50 percent. To capitalize on this trend and create even greater reliability, you have the option to configure the 9395 with inherent redundancy. Traditional UPS manufacturers can't deliver this additional availability without adding a more costly second UPS module.

Inherent redundancy: When at or below 50 percent capacity, the 9395's uninterruptible power modules (UPMs) automatically act as N+1 redundant systems.



9395 550 kVA

Measuring power performance: efficiency, power factor and THD

Power performance, which is measured by system efficiency, output power factor and THD, is the foundation of the 9395. It's the UPS's robust combination of these three elements that make it stand out as the premier UPS in its class. The table below demonstrates how the 9395 with Energy Saver System (ESS) compares to competitive UPS models. Most manufacturers must use input filters, which lower their efficiency rating, but the 9395 doesn't require them to obtain excellent input THD.

As an example, a large data center (2.2 MVA) would realize the following savings by using a 9395 with ESS compared to traditional N+1 systems:

- Additional energy savings: 2,917 MW hours
- Additional carbon savings: 2,523 tons
- Annual cost savings: $315,708

9395 (WITH ESS) ANNUAL POWER SAVINGS VS. THE COMPETITION

Model	kVA rating	Full load annual power savings	Half load power savings	Cooling power savings at half load	Total savings at half load (power and cooling)
Eaton Power Xpert 9395	1100				
vs. Competitor A	1000	$66,300	$35,700	$23,800	$59,500
vs. Competitor B	1000	$20,400	$15,300	$10,200	$25,500

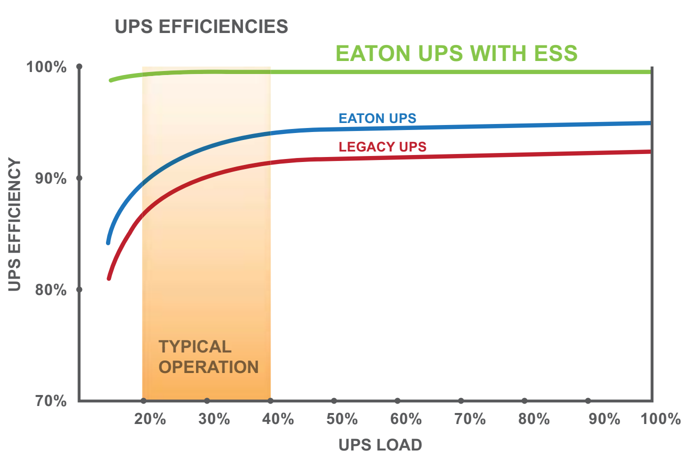
Costs calculated at industry average of $.10 per KWH.

9395 POWER DENSITY VS. THE COMPETITION (N+2 SYSTEM)

Model	kVA rating	KW per sq. foot	Annual space cost savings (at $1000 per sq. foot)
Eaton Power Xpert 9395	1100	25.5	
vs. Competitor A	1000	16.6	$15,000
vs. Competitor B	1000	16.9	$20,000

Energy Saver System

To demonstrate the importance of total system efficiency in relation to load level, the graph below shows how efficiency generally dips as load level decreases. In general, manufacturers list an optimal efficiency rating at full load. In reality, however, most three-phase UPSs operate in the range of 20-40 percent load. As a result, it's extremely important to evaluate the efficiency of a UPS at lighter loads as this graph depicts. The optional ESS technology operates at 99 percent efficiency even at low load levels, giving end users real energy savings.



View efficiency at-a-glance

Eaton's new 9395 color touchscreen is a 10-inch display that allows users to capture real-time data on efficiency, consumption, and load changes, along with many other capabilities.

Features and benefits:

- View efficiency, load level, and daily energy use at-a-glance
- Spot trends using the daily, monthly and yearly load-profiling screens
- Monitor battery usage in the improved battery log
- Track time in ESS and VMMS high-efficiency modes using the new statistics screen

New 10-inch color touchscreen



Prior 8-line monochrome button vs. the new 10-inch color touchscreen

9395 UPS Gets SMaRT®

The 9395 UPS is the first power quality product to receive a Sustainable Materials Rating Technology (SMaRT®) Gold certification. As a result, the UPS can contribute to Leadership in Energy and Environmental Design (LEED®) points for buildings and projects seeking LEED certification. SMaRT products must offer multiple environmental and economic benefits such as cost savings, design innovation, product differentiation, and also meet life cycle environmental performance requirements.

Eaton's SMaRT Gold certification is the next step for Eaton in documenting the environmental benefits associated with the production and use of the 9395. The 9395 has already passed rigorous testing to receive Eaton's Green Leaf designation, which verifies that the 9395 offers exceptional, industry-leading environmental benefits to customers, consumers and our communities

The SMaRT Gold certified 9395 can contribute points to two LEED Credit Categories: Innovation in Design Credit and the Energy and Atmosphere Credit. To learn more about credit categories and the USGBC LEED certification system, visit **www.usgbc.org/LEED.**

Powerware Hot Sync technology: the culmination of power reliability and systems availability

In systems with multiple uninterruptible power modules (UPMs), the 9395 leverages the synchronization, load sharing and selective trip capabilities of Eaton's patented Powerware Hot Sync technology. These capabilities are integral to the ultimate systems availability that's the primary requirement for any parallel UPS configuration.

Key design features of Hot Sync systems

- No system-level single point of failure.
- Paralleled UPMs operate completely independently; one module can't affect or interfere with the others – no domino-effect scenario.
- No added circuitry is required for parallel operation; any standard UPS can be used in a parallel system without modification.
- This patented and proven technology has been successfully deployed in thousands of systems around the world.

Sync Control technology

Sync Control ensures that the output of two or more separate UPSs (single modules or parallel systems) remain in phase with one another so static transfer switches connected between the separate distribution paths may change state seamlessly when necessary.

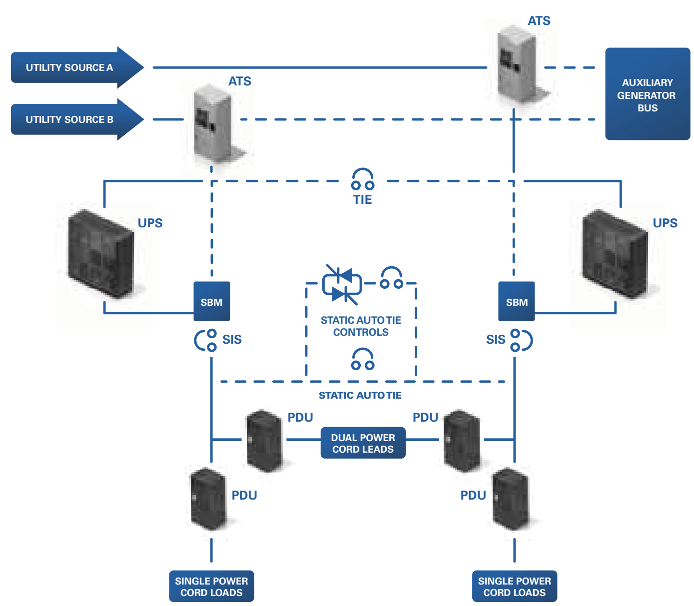
Static Auto Tie

The Static Auto Tie (SAT) system enhances reliability even further so full load transfers can be made autonomously. The SAT system adds a single wrap-around static switch to the tie breaker in the Hot-Tie system, then adds intelligent controls so a power protection system made up of two or more separate UPS systems can **automatically transfer entire** loads in the event of failure of one side of an A/B distribution system. This eliminates the need for numerous downstream static switches and costly wiring.

In the SAT configuration displayed in the diagram below, a SAT circuit between the outputs of the two UPS modules automatically transfers the loads from one to the other as necessary. This less complex, dual-path architecture streamlines the distribution system to eliminate series switching elements and reduce the potential downtime of single power cord loads by up to 50 percent. As a result, the SAT architecture offers a number of benefits, including:

- Reduced capital expenses and installation costs
- Eliminated need for traditional downstream static transfer switches
- Increased system reliability and efficiency
- Decreased maintenance requirements
- Reduced raised floor space requirements

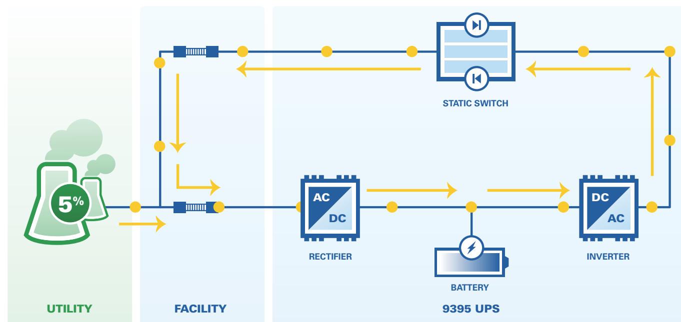
Fully deployed Static Auto Tie configuration



Easy Capacity Test

The 9395 has the unique ability to test its entire power train under full load stress without the requirement of an external load. With no load connected, the 9395 is able to test all its power-handling components, including the rectifier, inverter, contactors, fuses, power busses, cabling, batteries, bypass (static switch), magnetics, and filter capacitors. The net result of this innovative load test is that there are no load banks to rent, no temporary load connections to make, and no wasted energy. Furthermore, the 9395 has the ability to test the upstream bypass input breaker (BIB), the rectifier input breaker (RIB), and all the electrical cables between them. This load test feature can take the place of most traditional load bank tests to save you time and money during startup and commissioning. Eaton field technicians are trained to use this load testing capability during a startup service to ensure optimum calibration, maximum efficiency and inherent redundancy. As a result, they can produce a report that verifies these tests and the overall performance of the UPS. All preventive maintenance visits included with PowerTrust Service Plans for the 9395 include this unique load testing feature to ensure that the UPS is operating optimally. It also validates the performance of an installed UPS and can simulate various operations and power transfers.

Easy Capacity Test Power Flow



Scalable, redundant architecture meets current and future requirements

The 9395 combines the reliability and redundancy of a multi-module UPS into an integrated, pre-wired solution. With a unique, flexible design that provides scalability, the UPS can adapt to future changes in load demands and new requirements for higher reliability without requiring the purchase of an additional UPS. For example, the 9395 UPS enables you to add a 275 kVA UPM in the field for N+1 redundancy or capacity.



9395 825 kVA

System Bypass Module: unparalleled flexibility for your parallel UPS system

Four decades of experience in paralleling large UPS systems is incorporated in the System Bypass Module (SBM) from Eaton. For use with multi-module paralleled 9395 systems, the switchgear enclosure encompasses a centralized static switch. You can order it with either momentary or continuous duty rating, along with system-level circuit breakers for bypass, UPS system output, feedback protection and maintenance, or "wrap-around" bypass functions. Four ratings are available as standard: 1200A, 2000A, 3000A and 4000A. The customizable cabinet features a 10-inch color LCD screen to display status for up to 32 of the UPM modules, and provides an intuitive user operation interface.

The touch-sensitive SBM display shows a graphical view of the entire system one-line diagram, with intuitive controls and quick access to key information like battery time remaining, event/alarm history, system metering for kW and kVA, voltage, current, frequency, power factor and phase balance. The SBM also provides terminal connections for system-level building alarm inputs and relay outputs. To enhance flexibility, the system controls/monitoring section may also be deployed in custom or third-party switchgear, to ensure that the most reliable monitoring and user-friendly controls are included with alternative power circuit components.

The Eaton SBM incorporates the following hallmarks of Powerware Hot Sync paralleling technology, which has defined Eaton's most mission-critical UPS configurations for decades:

- Multiple UPS synchronization and load sharing accomplished without dependence on inter-module wiring networks.
- Peer-to peer architecture that operates the parallel system without the need for master load share or master synchronization controls. The system operates with NO centralized control circuit.
- Control Area Network (CAN) bus architecture to ensure precise load sharing <3% at full system load.
- No single point failure in powertrain or control.



Eaton 10-inch LCD SBM screen

Concurrent maintenance: higher availability

With 9395 redundant models, Eaton field technicians can, where permitted by local safety regulations, service key components in a redundant module while the other module carries the load. The 9395 also features a completely front-accessible design and can be installed against walls or back-to-back in multi-module configuration. This service-friendly design enhances maximum uptime and availability.

Ease of installation

Traditional multi-module installations require up to three times the footprint for power modules and tie cabinets. In contrast, the 9395 is a completely integrated large system that incorporates multiple power modules and system switchgear on factory pre-wired bases. Since everything is pre-wired, cabling costs and installation time are significantly reduced.



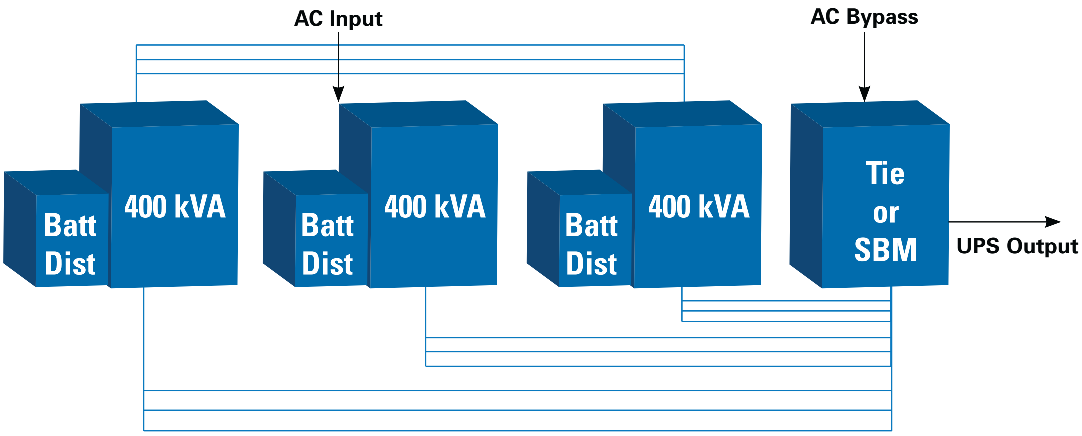
9395 550 kVA

825 kVA N+1: 9395 vs. Competitor

Competitor solution

125 sq. ft.
19,215 lb system weight*

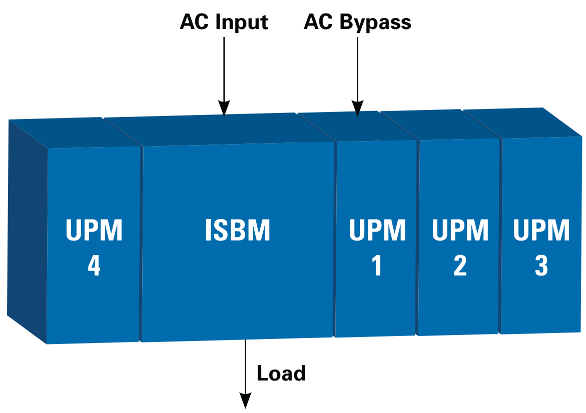
Extensive site wiring
**Excluding batteries*



9395 solution

39 sq. ft.
6,365 lb system weight*

Minimal site wiring
**Excluding batteries*



Greatly reduced footprint

The 9395 UPS offers the smallest footprint and lowest weight of any UPS in its class—50 to 60 percent less than competitive units. In fact, the 9395 fits a redundant design into the same footprint as a traditional, non-redundant UPS. The 9395's smaller footprint not only reduces your total cost of ownership, but also provides a UPS that's approximately half the weight of legacy and competitive systems. As a result, freight costs are much lower and the smaller size and weight of the UPS make it much easier to handle. In fact, the 9395 fits easily through all doors and can be transported on freight elevators. Unlike some larger and heavier systems, there's is no need to dismantle it to fit it on elevators or through doorways, which can cause significant delays and increase costs.

Minimized cabling requirements and expense

In an integrated system such as the 9395, multi-module systems arrive pre-wired with no need to perform costly and time-consuming inter-unit cabling for power and communications between modules and the system bypass unit. Considering the increasing cost for raw materials such as copper, this savings can be significant. Cabling enters the 9395 UPS from either the top or bottom of the cabinet to provide easier and more flexible installation.

Batteries: the heart of every UPS

When a utility power outage causes a UPS to switch to battery power, it's imperative that those batteries are healthy, charged and up to the task. Improper battery management is the number one cause of downtime. Many UPS batteries on the market today are constantly trickle-charged—a process that degrades the battery's internal chemical composition over time, reducing potential battery service life by as much as 50 percent. To address this, the 9395 uses a sensing circuit and innovative three-stage charging technique to significantly extend battery service life and optimize recharge time. In addition, temperature-compensated charging monitors temperature changes, and adjusts the rate of charge to prolong battery life.

Monitor batteries for optimum readiness

Advances in firmware and digital technology enable the 9395 to offer sophisticated battery monitoring and management features you might expect to find only on expensive add-on systems, including:

- Remaining battery runtime is calculated by using system loading and trended battery discharge data, plus internal sensing points for voltage and current data.
- Battery circuit test- a periodic full-load test of the battery string is done to ensure there are no open circuits or weak cells that would jeopardize battery performance and system availability.

In addition to these integrated monitoring features, we offer one year of secure, remote monitoring to provide 24x7 real-time monitoring of more than 100 UPS and battery alarms with eNotify. This real-time information is critical to help you make management decisions, from scheduling preventive maintenance to determining the best way to reduce loads during an outage.

By ensuring optimal battery health and availability, battery monitoring features raise the reliability of the 9395 beyond any other UPS in its class.

"We've been very pleased with the support we receive whenever we call. Because we rely heavily on the unit, and since we don't have the onsite expertise or staff to maintain it, having a service plan gives us additional peace of mind to know that it is being well maintained."

- Dean Kokko, wager operations manager, TVG

Service and support enhance performance

Eaton recognizes that superior power reliability requires flawless execution from our service team. Included at no extra charge with every 9395 is:

- 24x7x365 startup service and customer training
- One-year limited factory warranty[1]
- Service protection plan 24x7 coverage, eight-hour response (upgrade to four- or two-hour where available), parts and labor, unlimited on-site emergency response support
- eNotify Remote Monitoring Service: 24x7 critical alarm notification and monthly reports on UPS and battery health
- 24x7 technical support access



In addition to the warranty and first year of on-site coverage, Eaton offers a wide variety of support agreements for continued preventive and emergency response maintenance. PowerTrust Service Plans include:

- UPS and battery scheduled preventive maintenance
- Parts and labor coverage for electronics and/or batteries
- Factory-trained technicians with genuine Eaton parts and diagnostic tools
- eNotify Remote Monitoring Service
- Available coverage: 24x7, eight-four-two-hour response, or 8x5 next business day response
- 24x7 technical support access

1. Refer to the Eaton Corporation Limited Factory Warranty for three-phase UPS products for specifications, limitations, and terms. Service and support specifications may vary by country.

eNotify Remote Monitoring Service

All PowerTrust Service Plans include Eaton's eNotify Remote Monitoring Service, enabling Eaton service technicians to remotely monitor your UPS and batteries using one-way emails. With technical experts available to respond immediately and resolve many issues remotely, eNotify features 24x7 real-time monitoring of 100+ UPS and battery alarms.

The eNotify service provides you with monthly reports detailing the ongoing health of your 9395 UPS. The Customer Monitoring Report delivers information on your unit's voltages, loads, and external factors such as temperature and humidity. Additionally, the report provides information about the attached batteries and system availability. All these factors contribute to the Relative Health Index (RHI) score that allows you to compare your unit's health to Eaton's optimum operating levels.

Proactive monitoring is also included. Upon receipt of both status and event e-mails, anomalies are checked for incoming parametric or event data logs. If an anomaly is detected, Eaton analysts further study the data for possible impending failures and take appropriate action. The following critical alarms are provided by eNotify:

- UPS output power will turn off after the configured delay period
- Low battery alarm present
- UPS hardware fault detected
- UPS battery completely discharged
- UPS inverter fault detected
- UPS internally bypassed
- UPS output has been turned off
- UPS shutdown imminent alarm condition exists
- Failure of one or more fuses has been detected
- A relay, contactor or breaker has failed

The eNotify Remote Monitoring Service provides confidence that Eaton is continually watching your 9395 and combines its technical resources and field technicians as needed to quickly respond to critical alarms.



Sent via email to as many as six site contacts, the eNotify monthly Customer Monitoring Report provides a summary of the top 10 performance and environmental parameters, battery events, availability percentage, and comparative status against recommended specification.

> *"With eNotify, any alert immediately goes to our Network Operations Center, as well as to the people that we would turn around and call anyway. With Eaton, the technician is in the truck and on the road before they even hear from us — and that's a big deal."*
>
> *- Kevin Dorhman, CoSentry CTO*

Monitoring, control and reporting capabilities

Expanded solution: Ethernet connectivity

The Power Xpert® Gateway UPS card allows you to connect your 9395 UPS directly to your Ethernet network and the Internet. With its built-in Web server it provides information on one or more UPS modules remotely, without additional software.

Benefits:

- Remotely monitors the following critical data:
    - o UPS energy usage
    - o Load percentage
    - o Battery, alarm and load segment status
    - o THD and output power
- Configure shutdown agent and set up UPS shutdown schedules, as well as UPS test and control remotely
- Automatically maintains data, interval and event logs with time stamp for power and energy parameter analysis
- Integrates your UPS into existing building management or network management systems



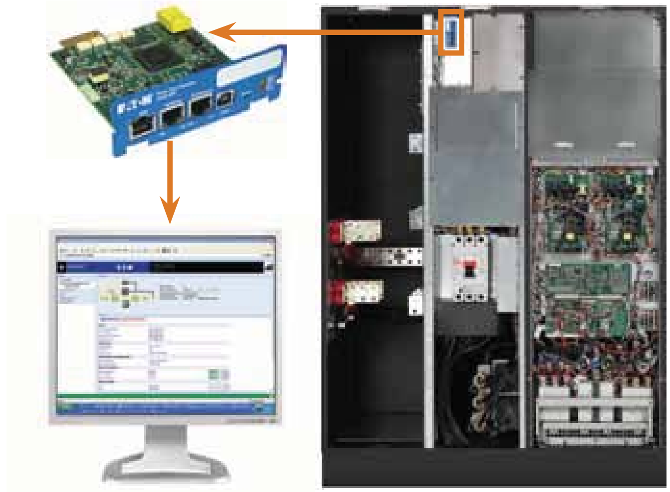
9390 and 9395 UPSs

Complete solution: Power Xpert Software and Reporting

Power Xpert Reporting takes your UPS, data center, and site monitoring to the next level. It allows you to see past individual measurements, trend graphs and events. It analyzes the complex data from multiple sites and boils it down into easy-to-understand graphical reports.

Benefits:

- At-a-glance analysis information, quickly see
    - o Power capacity reserves
    - o Potential high-power users
    - o Where power is consumed and usage patterns
    - o Current, voltage, and harmonic power quality event patterns and reoccurrence trends over time
    - o Temperature and humidity readings
- Know your PUE and DCiE immediately and how they change with energy saving efforts
- Know your IT vs. non-IT energy consumption
- Ten report templates meeting various energy and green reporting needs
- Assistance with LEED certification



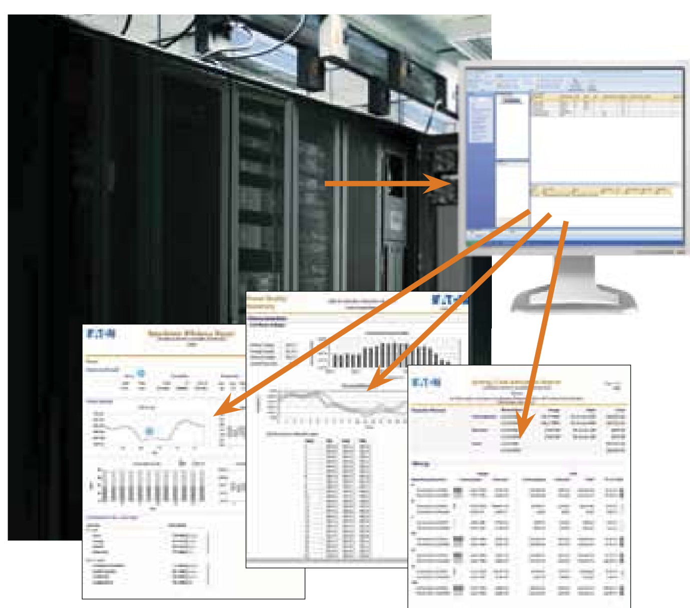
Ethernet connectivity

Powerful solution: Power Xpert Software

Once your 9395 is on the network via the Power Xpert Gateway UPS card, you can centralize and analyze data with Power Xpert Software.

Benefits:

- Monitor your entire data center or power system giving you the big picture of power quality and energy usage to proactively address issues
- Graphical and at-a-glance user views allowing simultaneous monitoring of multiple UPSs and other equipment
- Allows the full capability to monitor Powerware Hot Sync systems
- Data, interval, and event logging with time stamp for power and energy parameters from your 9395 UPSs, as well as power distribution and other power system equipment



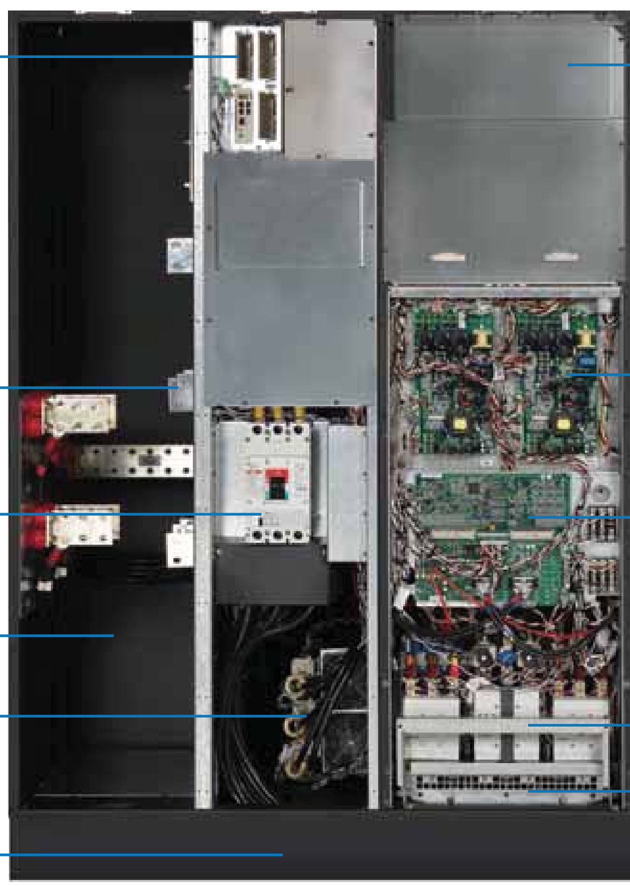
Sample reports as generated by Power Xpert Reporting

Core components



9395 825 kVA N+1 or 1100 kVA capacity

A closer look inside the 9395



9395 275 kVA

Technical specifications[2]

UPS rating (0.91 power factor)

kVA	~~225~~	~~250~~	~~275~~	~~450~~	~~500~~	~~550~~	~~650~~	~~750~~	825	~~1000~~	~~1100~~
kW	~~205~~	~~228~~	~~250~~	~~410~~	~~450~~	~~501~~	~~592~~	~~683~~	751	~~910~~	~~1001~~

General characteristics

Efficiency	>94% ~~(99% with ESS)~~
Parallel capability	4 distributed, 32 with SBM
Max modules per size	Up to 3 modules, 550 kVA, up to 4 modules, 825/1100 kVA
Audible noise	<76dBA @ 1 meter
Altitude (max)	2000m at 40°C (104°F)
N+1 redundancy capable	Yes
~~Field upgradeable~~	~~Yes~~
System bypass module	Included

Input characteristics

Voltage	480V standard; ~~and 400V available~~
Voltage range	+10% / -15%
Frequency range	45-65 Hz
Power factor	0.99 (minimum)
Input current distortion	<3.5% (no input filter required)
Soft start capability	Yes
Internal backfeed protection	Yes

Output characteristics

Voltage	480V standard; ~~and 400V available~~
Regulation	±1%
Inverter	PWM with IGBT switching
Voltage THD	<2% (100% linear load); <5% (non-linear load)
Load power factor range	Up to a .9 power factor leading without derating

Battery

Battery types	VRLA, AGM, wet cell
Battery voltage	480V
Temperature compensation	Optional
Charging method	ABM technology or float, selectable

Dimensions and weights

~~225 kVA, 275 kVA~~	~~52.4"w x 32.7"d x 73.6"h~~	~~1786 lb~~
~~225 kVA redundant, 275 kVA redundant~~	~~73.7"w x 32.7"d x 73.6"h~~	~~2875 lb~~
~~450, 500, 550 kVA~~	~~73.7"w x 32.7"d x 73.6"h~~	~~2977 lb~~
~~450, 550 kVA redundant~~	~~103"w x 32.7"d x 73.6"h~~	~~4153 lb~~
~~Field upgrade module, 225 or 275 kVA~~	~~30"w x 32.7"d x 73.6"h~~	~~1176 lb~~
~~650, 750, 825 kVA~~	~~140.9"w x 32.7"d x 73.7"h~~	~~5065 lb~~
~~650, 750,~~ 825 kVA +1 redundant	170.2"w x 32.7"d x 73.7"h	6365 lb
~~1000, 1100 kVA~~	~~170.2"w x 32.7"d x 73.7"h~~	~~8525 lb~~

General characteristics

Control panel (LCD)	10-inch Color Touchscreen with LED panel
Battery startup	Standard
Frequency conversion	Standard
Multi-language	Standard
Building alarm inputs	5 (galvanic isolated)

Options

- External maintenance bypass
- PDU, RPP ~~and STS~~
- ~~Maintenance bypass module, matching cabinet, 2/3/4 breaker~~
- ~~DC disconnects~~
- ~~65 or~~ 100 kAIC input breakers

Certifications

Safety	UL1778, cUL
EMC	IEC 62040-2, EN50091 Class A (restricted access)

eNotify remote monitoring

24x7 remote monitoring of UPS and battery alarms, daily heartbeat check and monthly report. eNotify requires the PXGX-UPS card and Environmental Monitoring Probe.

Communications

Software compatibility: Software and Power Xpert Reporting
Communications cards: Four communication bays standard. The following connectivity options can be installed at any time:
- PXGX-UPS card (included with eNotify activation)
- ~~ModBus RTU card~~
- ~~AS/400 Relay card~~
- Industrial Relay card
- ~~Powerware HotSync CAN Bridge card~~
- ~~Environmental Monitoring Probe (included)~~

Remote inputs/outputs: Five building alarm inputs and one summary alarm contact (5A @ 120V) standard
Remote monitor panel: Eight backlit status indicator lamps plus an audible horn

1. Due to continuing improvements, specifications are subject to change without notice.
2. Please refer to Eaton Power Xpert 9395 technical documents for specific configuration guidelines and features.

For more information on the 9395, visit
Eaton.com/9395

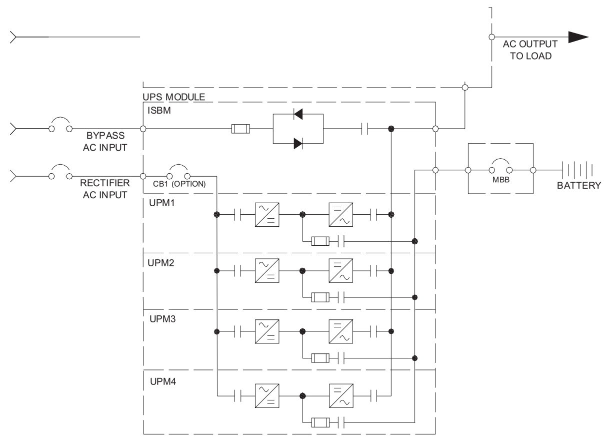
Eaton
Electrical Sector
1000 Eaton Boulevard
Cleveland, OH 44122 USA
Eaton.com

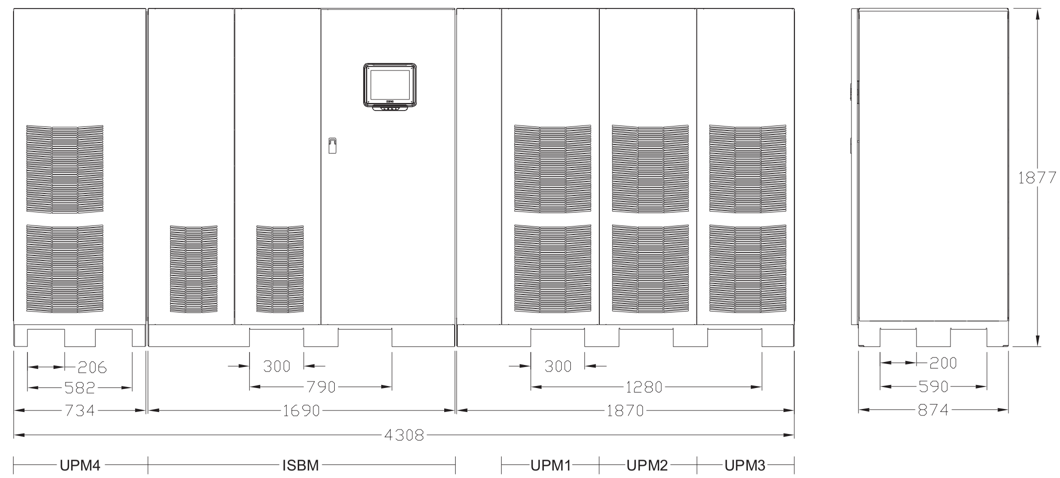
Powerquality.eaton.com

Printed in USA
9395FXA
May 2013

EATON
Powering Business Worldwide

SITE PLANNING DATA SYSTEM 9395-825 PLUS 1 ISBM, MODELS 650, 750, 825kVA, SINGLE MODULE

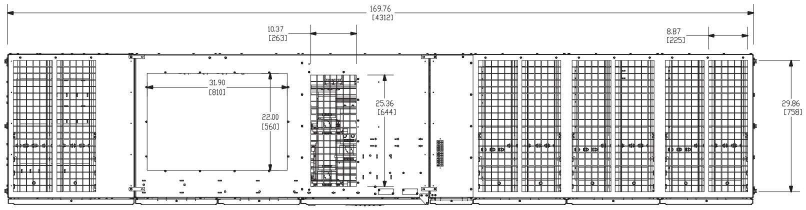




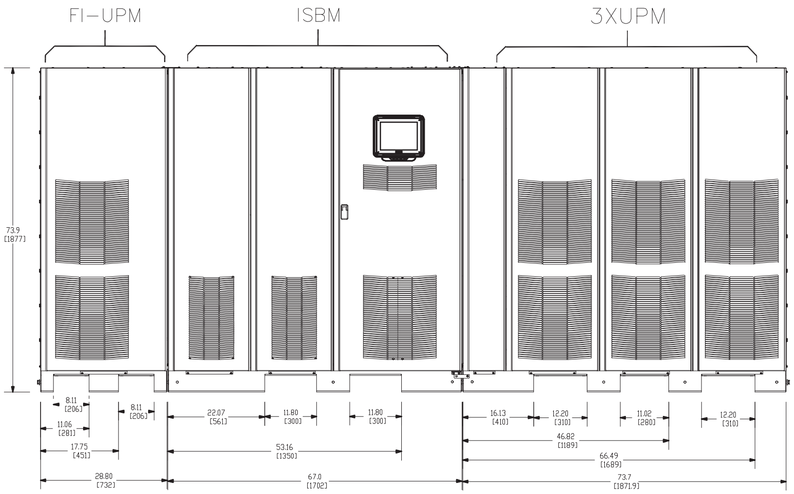
Notes:
1. Inverter AC output current calculation: Nameplate - 100% rated output load.
2. Bypass AC input current calculation is based on 100% rated output.
3. The system must be installed on a level floor suitable for computer or electronic equipment.
4. The system must be installed in a temperature and humidity controlled indoor area free of conductive contaminants.
5. Ambient temperature range: 0-40C (32-104F); Recommended operating range: 20-25C (68-77F); Maximum relative humidity: 95% non-condensing.
6. Minimum overhead clearance for ventilation above the UPS cabinet is 457mm (18in.).
7. Minimum 915mm (36in.) clearance in front of the UPS cabinet is required for cooling air intake and servicing space.
8. The UPS cabinet can be installed in line-up-and-match or standalone configurations.
9. Top and bottom cable entries through removable access plates are standard for all configurations. Access plates shall be custom-modified to suit conduit sizes.
10. All wiring is to be in accordance with National and Local Electric Codes.
11. AC input to UPS rectifier (0.98 min.pF): (3) phases, (1) ground.
    AC output to load: (3) phases, (1) neutral if required, (1) ground.
    AC input to UPS bypass: (3) phases, (1) neutral if required, (1) ground.
    DC input from battery to UPS: (1) positive, (1) negative, (1) ground.
12. The front panels must be removed to meet the 830mm (or 32.7" depth) to fit through doors.
13. If the UPS is to be installed with the right side near a wall a minimum of 6" is required between the wall and the unit. If a battery cabinet is installed to the right of the UPS the 6" are not required.
14. Specifications are subject to change.

Product Specifications

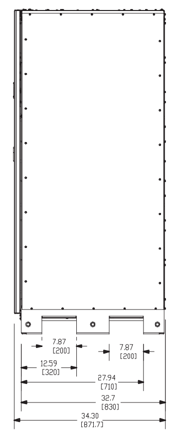
UPS Rating		AC Input Voltage	AC Output Voltage	Rectifier AC Input Current	Inverter AC Output Current	Max. Heat Dissipation at 100% Load	Dimensions WxDxH	Max. Weight Unpacked	Floor Loading	Battery Nameplate Current (240 Cell, 2.00 V/cell)	Max. Battery Current at End of Discharging (240 Cell, 1.67V/cell)
				Nameplate	Nameplate						
kVA	kW	VAC	VAC	AMP	AMP	kW(BTU/hr)	mm(in)	kg(lbs)	kg/m2(lb/ft2)	AMP	AMP
650	591	480	480	892	782	37.2 (126842)	4308x874x1877 (169.6x34.4x73.9)	3143 (6930)	835 (171)	1280	1560
750	682	480	480	1029	902	42.9 (146356)	4308x874x1877 (169.6x34.4x73.9)	3143 (6930)	835 (171)	1503	1800
825	750	480	480	1132	992	47.2 (160991)	4308x874x1877 (169.6x34.4x73.9)	3143 (6930)	835 (171)	1600	1981



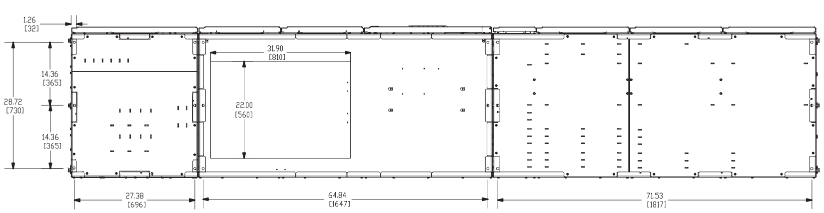
TOP VIEW



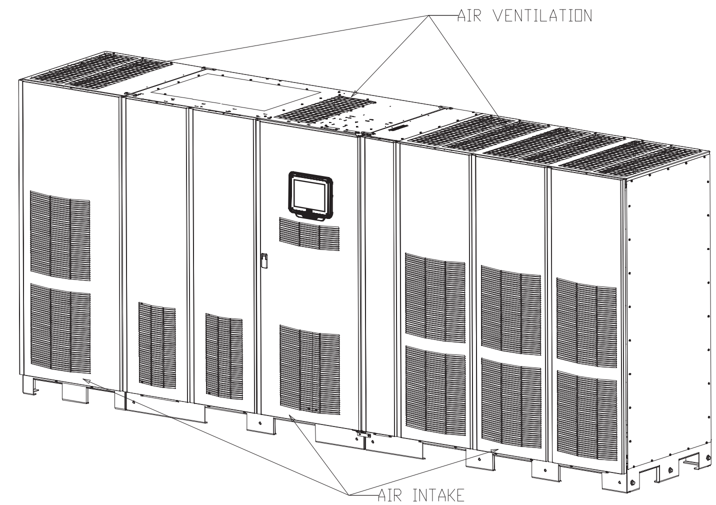
FRONT VIEW



SIDE VIEW



BOTTOM VIEW



ISOMETRIC VIEW

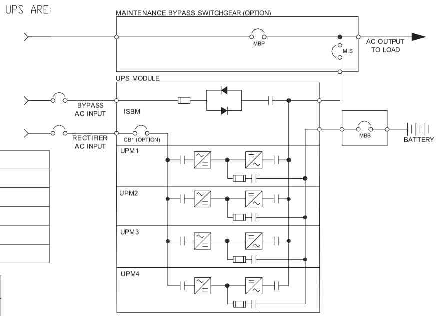
THE UPS CABINET USES FORCED AIR COOLING TO REGULATE INTERNAL COMPONENT TEMPERATURE. AIR INLETS ARE IN THE FRONT OF THE CABINET AND OUTLETS ARE IN THE TOP. ALLOW CLEARANCE IN TABLE BELOW FOR PROPER AIR CIRCULATION

THE BASIC ENVIRONMENTAL REQUIREMENTS FOR OPERATION OF THE UPS ARE:

- AMBIENT TEMPERATURE RANGE: 0-40°C (32-104°F)
- RECOMMENDED OPERATING RANGE: 20-25°C (68-77°F)
- MAXIMUM RELATIVE HUMIDITY: 95%, NONCONDENSING

UPS CABINET CLEARANCE	
FROM TOP OF CABINET	18" (457.2 mm) MINIMUM CLEARANCE
FROM FRONT OF CABINET	36" (914.4 mm) WORKING SPACE
FROM BACK OF CABINET	NONE REQUIRED
FROM RIGHT SIDE OF CABINET	6" (152.4 mm) WORKING SPACE
FROM LEFT SIDE OF CABINET	NONE REQUIRED

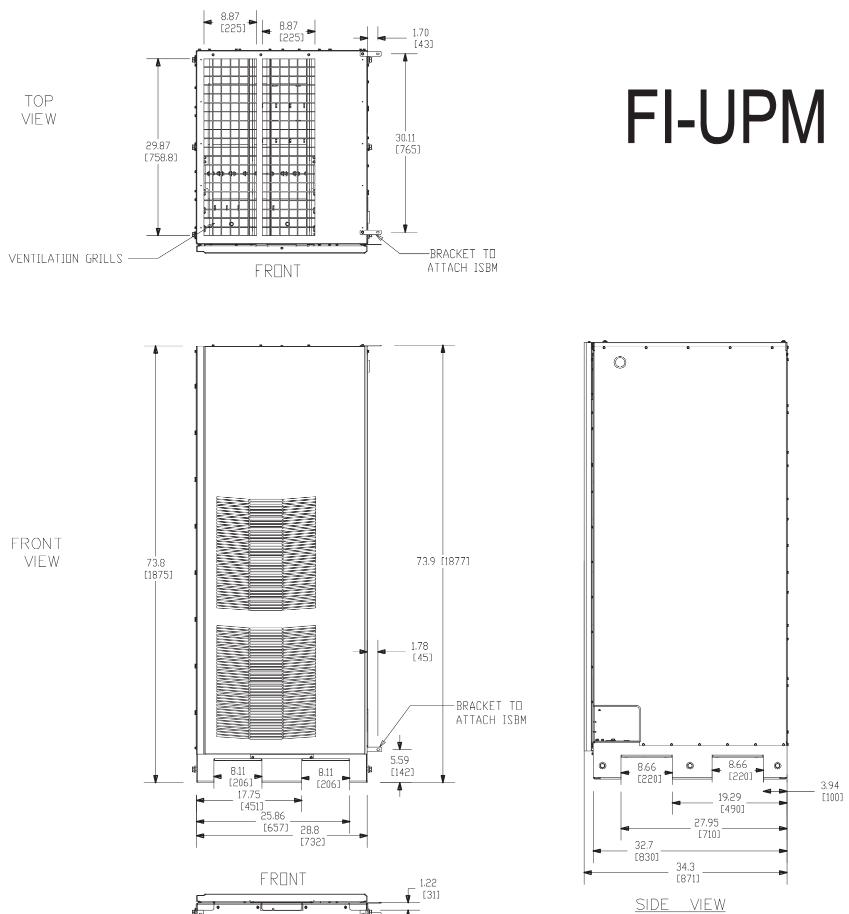
MAXIMUM WEIGHT	Kgs [Lbs]
	3143 [6930]

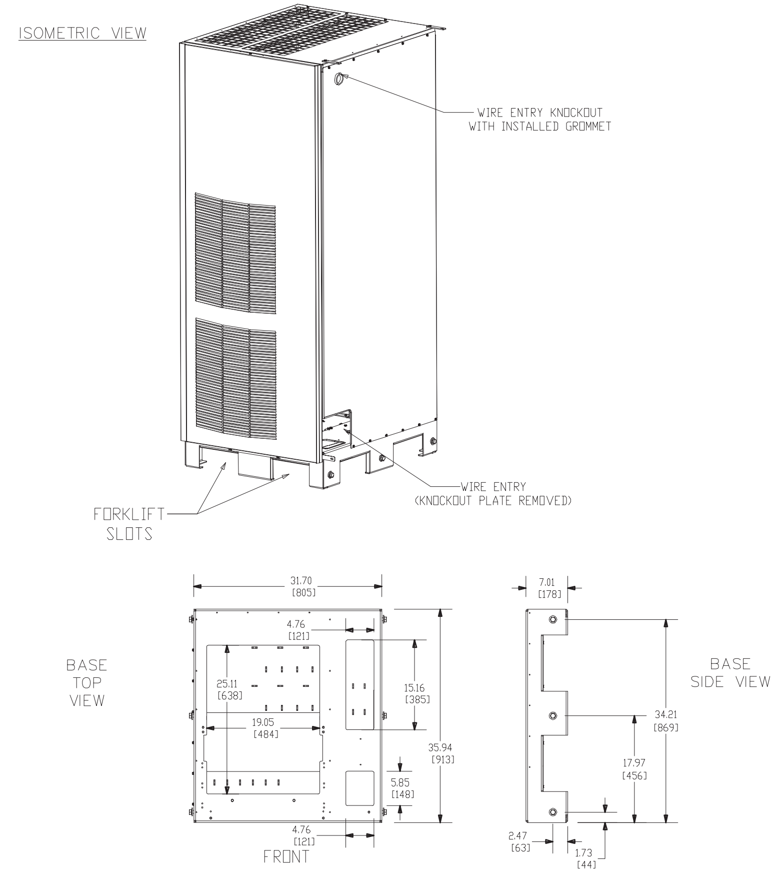


ONE-LINE DRAWING

METRIC	THIRD ANGLE PROJECTION	EATON CORPORATION, ELECTRICAL	SIZE: B
DESCRIPTION: 9395, UPS, 825+1 KVA (FI-UPM, ISBM AND 3XUPM)			
MODIFIED BY: L LYNAM	DATE: 13FEB2013	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE: ANGLES:? ±1/2° DECIMALS: 0,X: ±0,75 X, (FOR X < 3): ±1; HOLES: ø±0,13?? 0,XX: ±0,25 X, (FOR X > 3): ±2,5; DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING	SCALE: NTS DO NOT SCALE DRAWING OR CHANGE MANUALLY
ECO: ECO-044350	STATE: RELEASED	PART NAME: 110100243-004 REVISION: 4	SHEET 1 OF 4

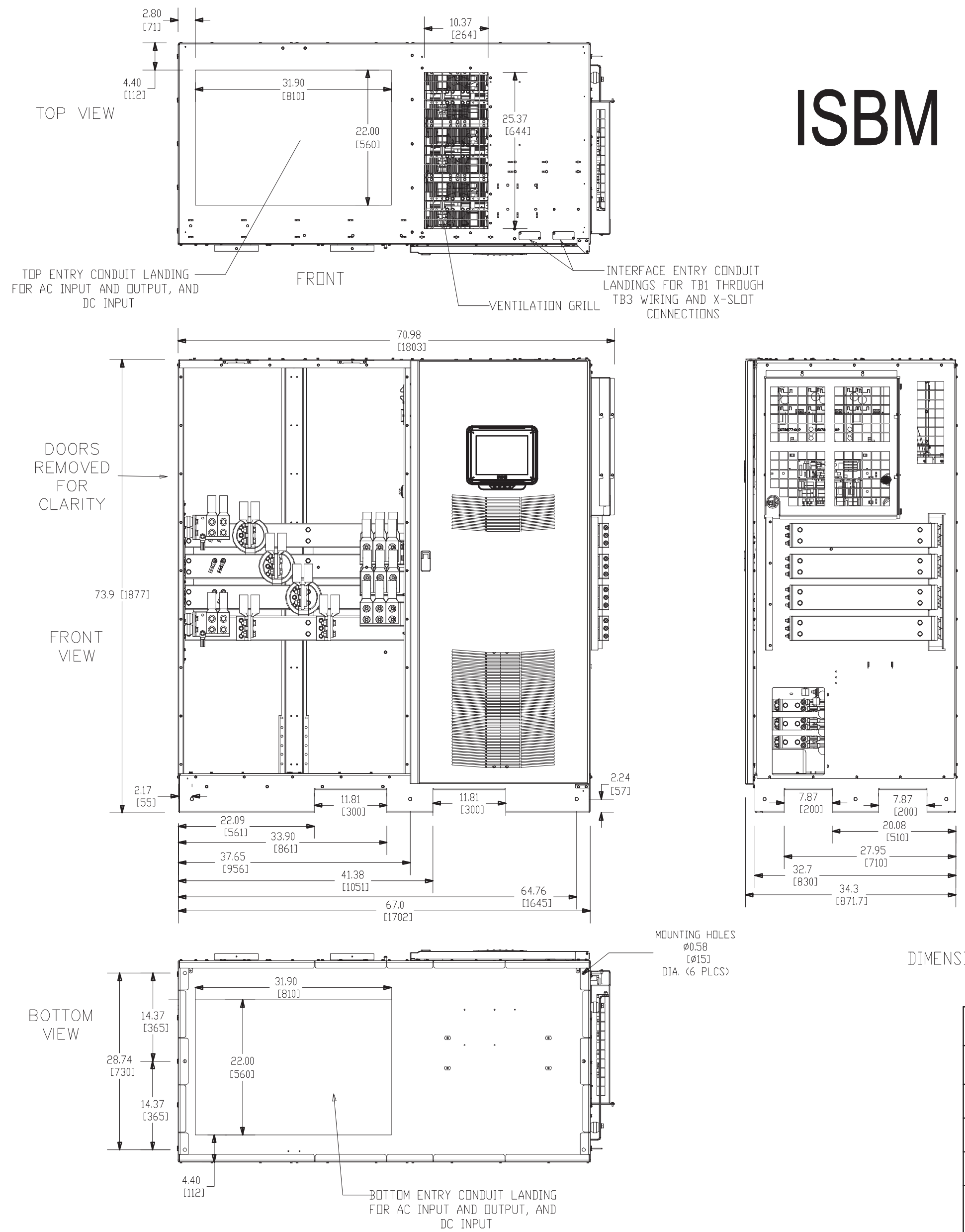
FI-UPM

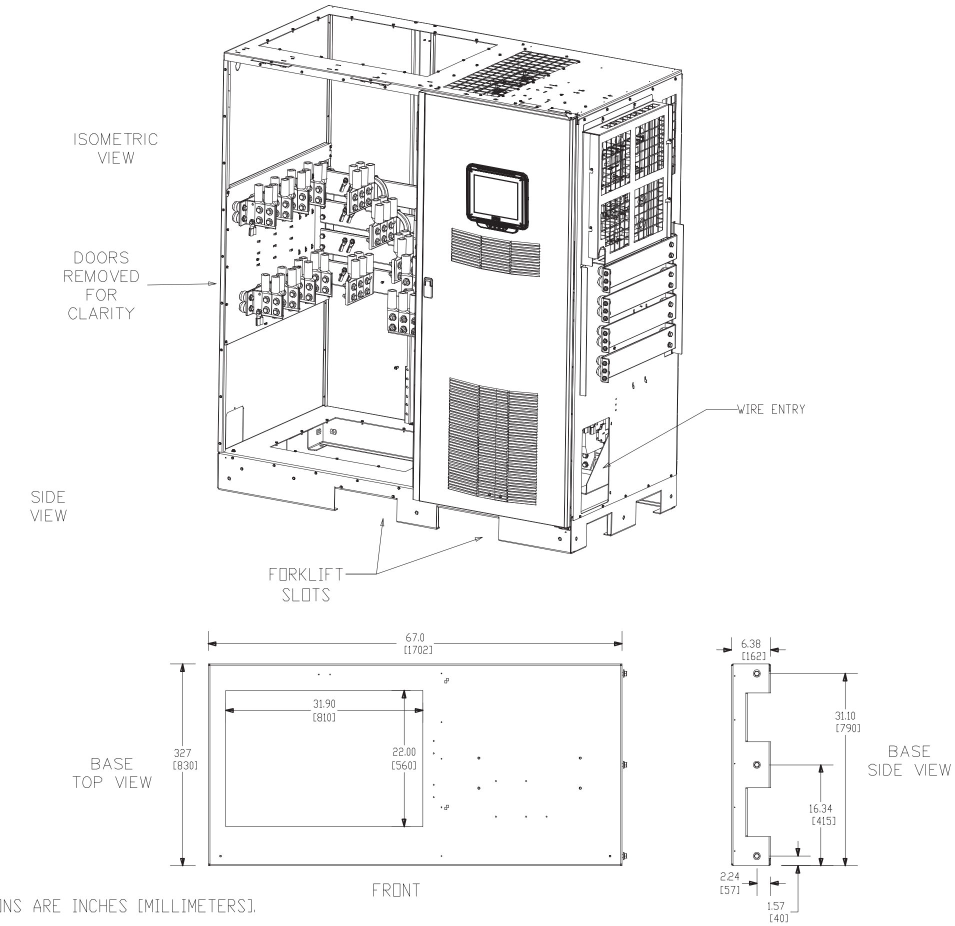




METRIC	THIRD ANGLE PROJECTION	EATON CORPORATION, ELECTRICAL	EATON	SIZE: B
DESCRIPTION: 9395, UPS, 825+1 KVA (FI-UPM, ISBM AND 3XUPM)				
MODIFIED BY: L LYNAM	DATE: 13FEB2013	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE: ANGLES:? ±1/2° DECIMALS: 0,X: ±0,75 X, (FOR X < 3): ±1 HOLES: ø±0,13?? 0,XX: ±0,25 X, (FOR X > 3): ±2,5 DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING		SCALE: NTS DO NOT SCALE DRAWING OR CHANGE MANUALLY
ECO: ECO-044350	STATE: RELEASED			
		PART NAME: 110100243-004	REVISION: 4	SHEET 2 OF 4

ISBM

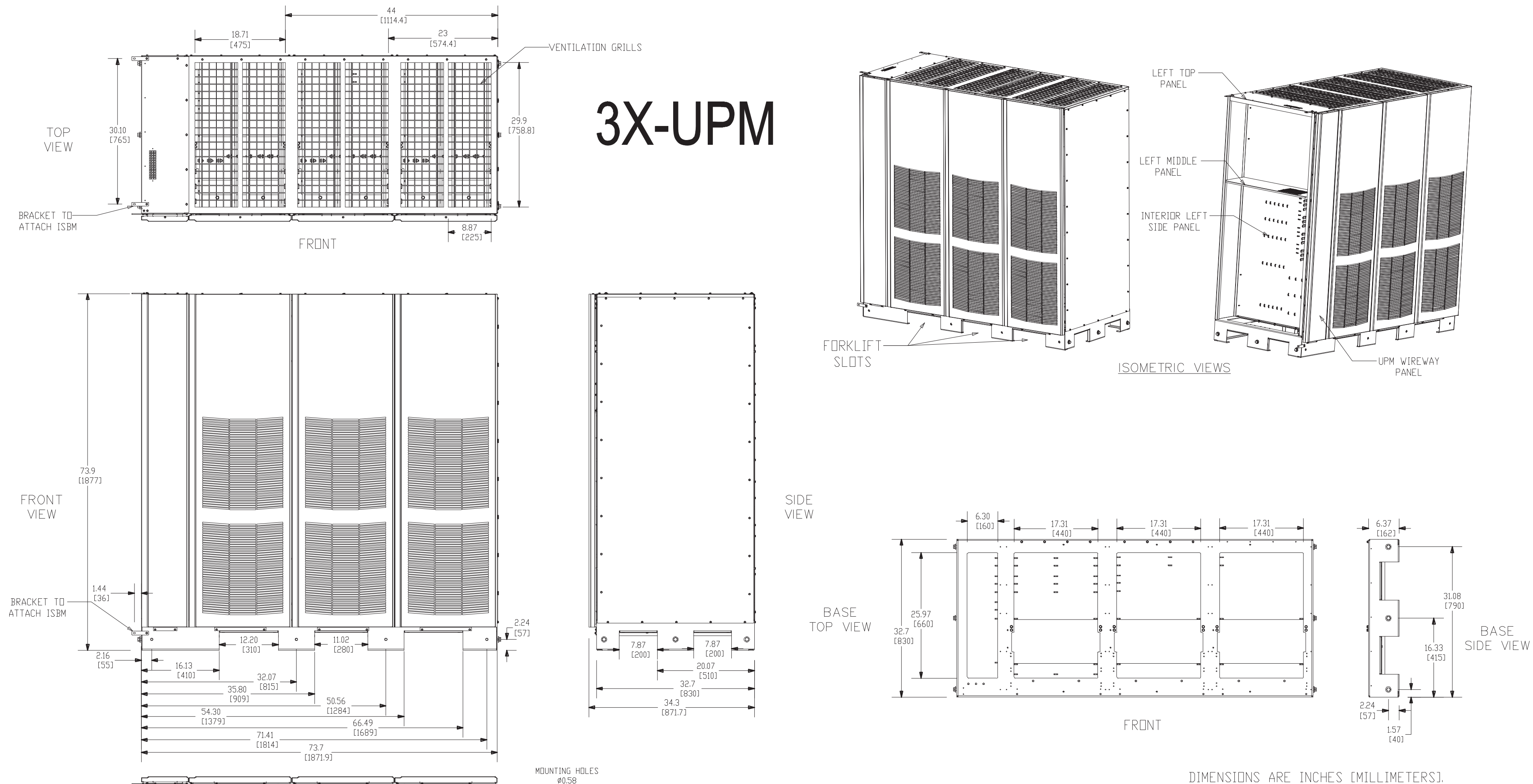


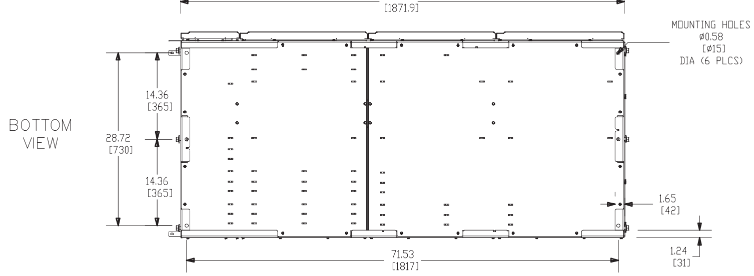


DIMENSIONS ARE INCHES [MILLIMETERS].

METRIC	THIRD ANGLE PROJECTION	EATON CORPORATION, ELECTRICAL	EATON	SIZE: B
DESCRIPTION: 9395, UPS, 825+1 KVA (F1-UPM, ISBM AND 3XUPM)				
MODIFIED BY: L LYNAM	DATE: 13FEB2013	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE: ANGLES:? ±1/2° DECIMALS: 0,X: ±0,75 X, (FOR X < 3): ±1; HOLES: ø±0,13?? 0,XX: ±0,25 X, (FOR X > 3): ±2,5; DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING		SCALE: NTS DO NOT SCALE DRAWING OR CHANGE MANUALLY
ECO: ECO-044350	STATE: RELEASED			
		PART NAME: 110100243-004	REVISION: 4	SHEET 3 OF 4

3X-UPM





METRIC	THIRD ANGLE PROJECTION	EATON CORPORATION, ELECTRICAL	EATON	SIZE: B
DESCRIPTION: 9395, UPS, 825+1 KVA (F1-UPM, ISBM AND 3XUPM)				
MODIFIED BY: L LYNAM	DATE: 13FEB2013	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE: ANGLES:? ±1/2° DECIMALS: 0,X: ±0,75 X, (FOR X < 3): ±1		SCALE: NTS DO NOT SCALE DRAWING OR CHANGE MANUALLY
ECO: ECO-044350	STATE: RELEASED	HOLES: ø±0,13?? 0,XX: ±0,25 X, (FOR X > 3): ±2,5 DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING		
		PART NAME: 110100243-004	REVISION: 4	SHEET 4 OF 4

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Table 3-1. UPS Cabinet Weights

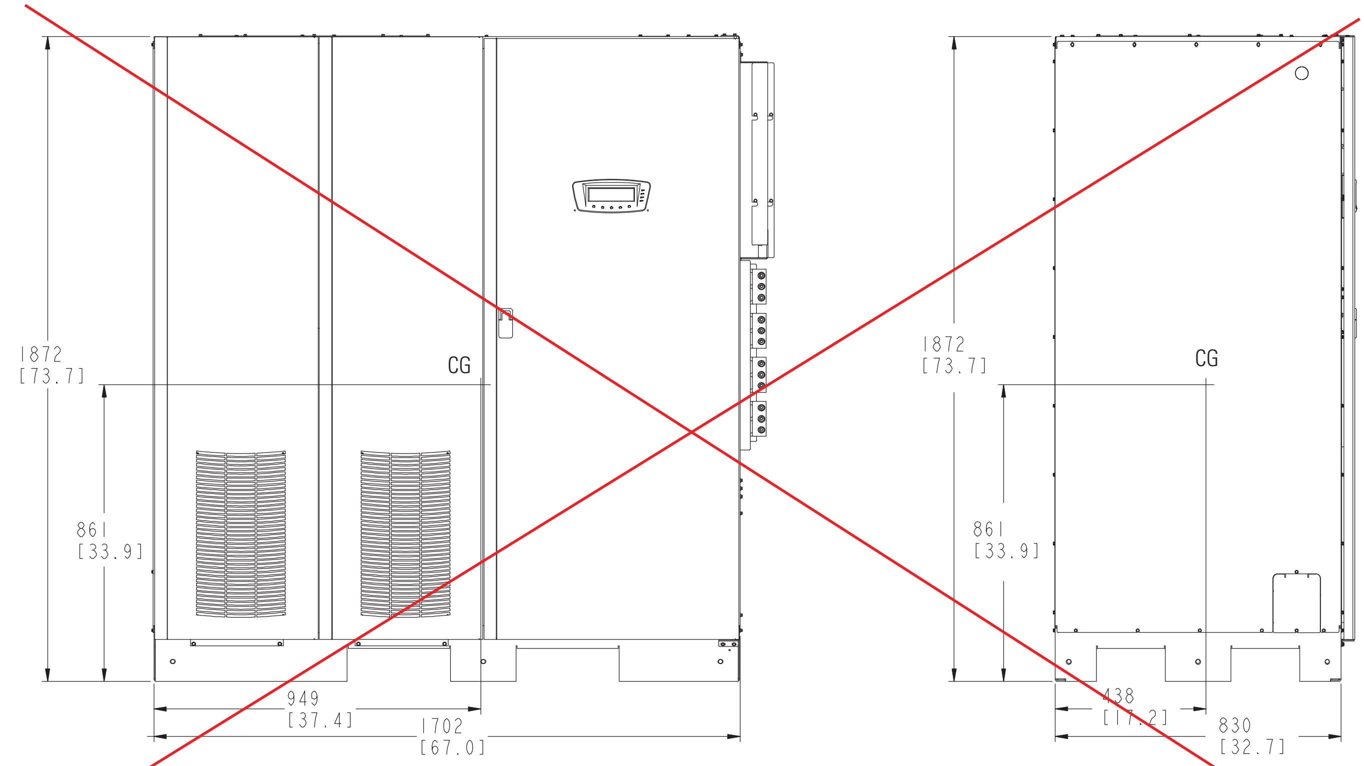
Model	Section	Weight kg (lb) Shipping	Weight kg (lb) Installed
Eaton 9395-825/450	ISBM (CSS)	797 (1757)	729 (1607)
	UPM (Two UPM)	1159 (2556)	1093 (2410)
Eaton 9395-825/500	ISBM (CSS)	797 (1757)	729 (1607)
	UPM (Two UPM)	1159 (2556)	1093 (2410)
Eaton 9395-825/550	ISBM (CSS)	797 (1757)	729 (1607)
	UPM (Two UPM)	1159 (2556)	1093 (2410)
Eaton 9395-825/650	ISBM (MSS)	652 (1437)	588 (1297)
	ISBM (CSS)	797 (1757)	729 (1607)
	IOM	599 (1321)	490 (1181)
	UPM (Three UPM)	1699 (3745)	1628 (3590)
Eaton 9395-825/750	ISBM (MSS)	652 (1437)	588 (1297)
	ISBM (CSS)	797 (1757)	729 (1607)
	IOM	599 (1321)	490 (1181)
	UPM (Three UPM)	1699 (3745)	1628 (3590)
Eaton 9395-825/825	ISBM (MSS)	652 (1437)	588 (1297)
	ISBM (CSS)	797 (1757)	729 (1607)
	IOM	599 (1321)	490 (1181)
	UPM (Three UPM)	1699 (3745)	1628 (3590)

NOTE MSS = Momentary Static Switch; CSS = Continuous Static Switch; IOM = Input Output Module

The UPS cabinet uses forced air cooling to regulate internal component temperature. Air inlets are in the front of the cabinet and outlets are in the top. Allow clearance in front of and above each cabinet for proper air circulation. The clearances required around the UPS cabinet are shown in Table 3-2.

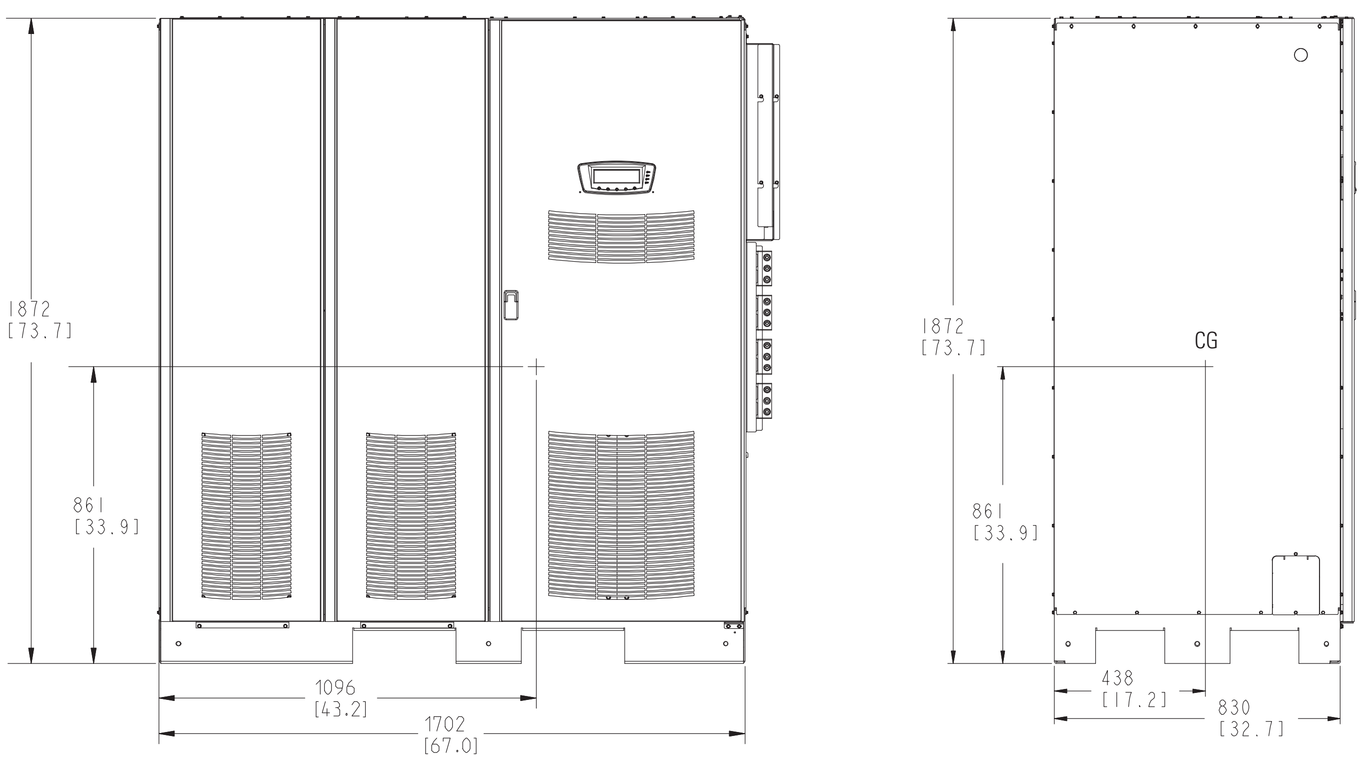
Table 3-2. UPS Cabinet Clearances

From Top of Cabinet	457.2 mm (18″) minimum clearance for ventilation
From Front of Cabinet	914.4 mm (36″) working space
From Back of Cabinet	None Required
From Right Side of Cabinet	152.4 mm (6″) working space
From Left Side of Cabinet	None Required



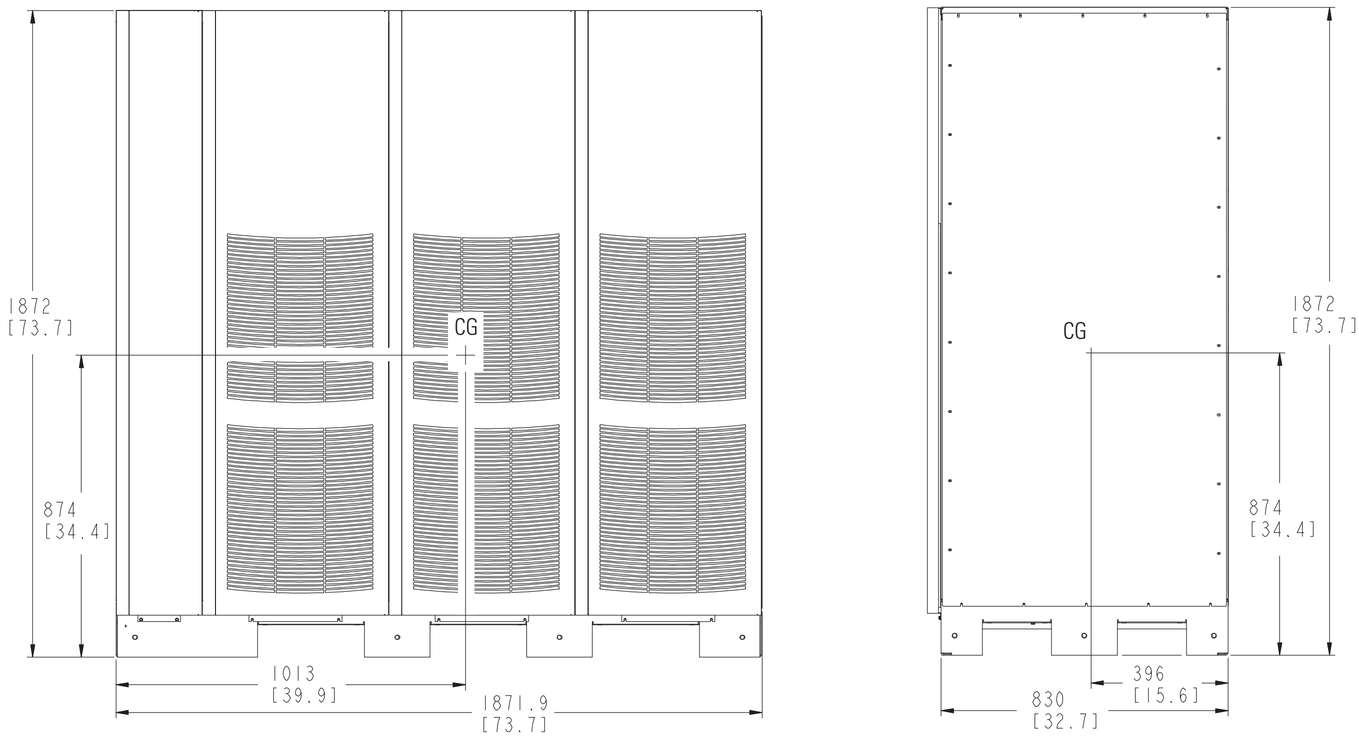
Dimensions are in millimeters [inches].

Figure 3-11. ISBM Section Center of Gravity – Momentary Static Switch



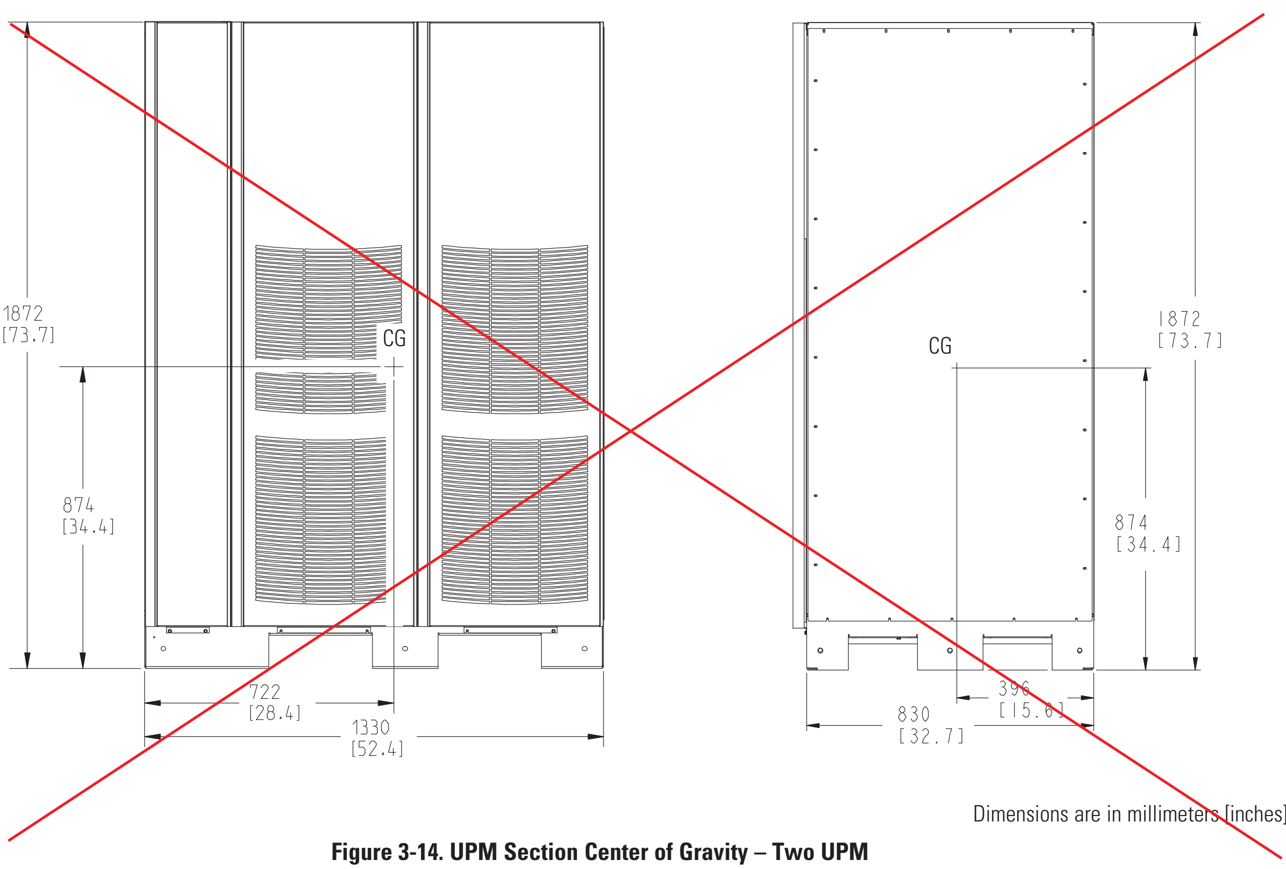
Dimensions are in millimeters [inches].

Figure 3-12. ISBM Section Center of Gravity – Continuous Static Switch



Dimensions are in millimeters [inches].

Figure 3-13. UPM Section Center of Gravity – Three UPM



Dimensions are in millimeters [inches].

Figure 3-14. UPM Section Center of Gravity – Two UPM

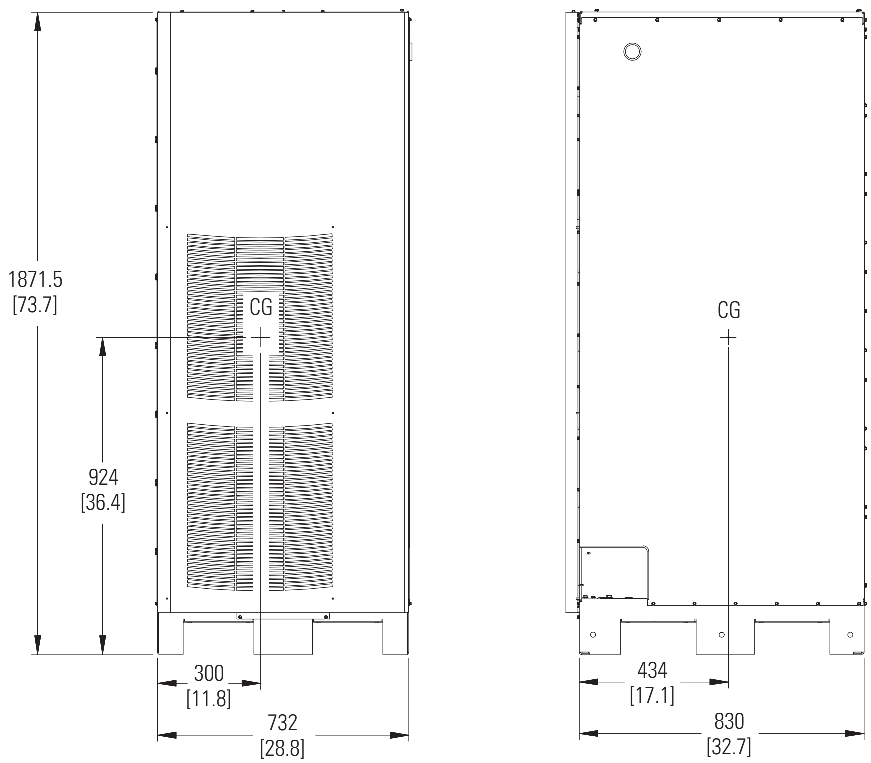


Figure 3-6. FI-UPM Cabinet Center of Gravity

3.3 Inspecting and Unpacking the FI-UPM Cabinet

The FI-UPM cabinet is palleted separately for shipping. The cabinet is shipped bolted to a wooden pallet and protected with outer protective packaging material (see Figure 3-7).

WARNING

The FI-UPM cabinet is heavy (see Table 3-1 on page 3-2). If unpacking and unloading instructions are not closely followed, the cabinet may tip and cause serious injury.

1. Carefully inspect the outer packaging for evidence of damage during transit.

CAUTION

Do not install a damaged cabinet. Report any damage to the carrier and contact an Eaton service representative immediately.

NOTE *For the following step, verify that the forklift or pallet jack is rated to handle the weight of the cabinet (see Table 3-1 on page 3-2 for cabinet weight).*

2. Use a forklift or pallet jack to move the packaged cabinet to the installation site, or as close as possible, before unpacking. If possible, move the cabinet using the pallet. Insert the forklift or pallet jack forks from the right side of the pallet (facing the cabinet), between the supports on the bottom of the pallet (see Figure 3-6 for the FI-UPM cabinet center of gravity measurements).

Table 3-4. Input/Output Ratings and External Wiring Requirements for the Three UPM Eaton 9395-825/650, 9395-825/750, and 9395-825/825 – Common Battery

		Units	Rating 50/60 Hz					
Basic Unit Rating		kVA kW	650 592	650 592	750 683	750 683	825 751	825 751
Input and Output Voltage		Volts	400/400	480/480	400/400	480/480	400/400	480/480
AC Input to UPS Rectifier (0.98 Minimum pF) Full load current plus battery recharge current (3) Phases, (1) Ground	A	Amps	1079	891	1245	1028	1369	1130
Minimum Conductor Size Number per Phase		AWG or kcmil (each)	500 (4)	500 (3)	500 (4)	500 (4)	500 (5)	500 (4)
AC Input to UPS Bypass (Four Wire) Full Load Current (3) Phases, (1) Ground	B	Amps	938	782	1083	902	1191	992
Minimum Conductor Size Number per Phase		AWG or kcmil (each)	500 (3)	350 (3)	500 (4)	500 (3)	500 (4)	500 (4)
AC Input to UPS Bypass (Five Wire) Full Load Current (3) Phases, (1) Neutral, (1) Ground	B	Amps	938	782	1083	902	1191	992
Minimum Conductor Size Number per Phase		AWG or kcmil (each)	400 (4)	500 (3)	500 (5)	500 (4)	500 (5)	500 (5)
DC Input from Each Battery Disconnect to UPS (1) Positive, (1) Negative	C	Total Amps	1280	1280	1502	1502	1600	400
Minimum Conductor Size Number per Pole		AWG or kcmil (each)	350 (6)	350 (6)	500 (6)	500 (6)	500 (6)	500 (2)
AC Output to Critical Load (Four Wire) Full Load Current (3) Phases, (1) Ground	D	Amps	938	782	1083	902	1191	992
Minimum Conductor Size Number per Phase		AWG or kcmil (each)	500 (3)	350 (3)	500 (4)	500 (3)	500 (4)	500 (4)
AC Output to Critical Load (Five Wire) Full Load Current (3) Phases, (1) Neutral, (1) Ground	D	Amps	938	782	1083	902	1191	992
Minimum Conductor Size Number per Phase		AWG or kcmil (each)	400 (4)	500 (3)	500 (5)	500 (4)	500 (5)	500 (5)
Neutral Bonding Jumper (Four Wire Output Only) Minimum Conductor Size Number	–	AWG or kcmil (each)	4/0 (1	4/0 (1)	4/0 (1	4/0 (1)	4/0 (1	4/0 (1)

NOTE Callout letters **A**, **B**, **C**, and **D** map to Figure 6-5 , Figure 6-7, Figure 6-9, Figure 6-11, or Figure 6-15. Callout letters **A**, **C**, and **D** map to Figure 6-17 or Figure 6-19.

NOTE Bypass wiring data is not applicable to IOM configurations.

Terminals E1A through E5A and E9A through E12A are stud type terminals. The intercabinet power wiring connections for this equipment are rated at 90°C. See Table 3-9 for intercabinet power cable terminations and Table 3-10 for supplied intercabinet wiring terminal hardware.

The torque values listed in Table 3-9 for the M8 studs are the maximum allowable. Tightening further will risk breaking or twisting the stud.

Figure 4-10 through Figure 4-17 starting on page 4-14 show the location of the intercabinet power cable terminals inside the UPS.

Table 3-9. UPS Intercabinet Power Cable Terminations for the Three UPM Eaton 9395-825/650, 9395-825/750, and 9395-825/825 and the Two UPM Eaton 9395-825/450, 9395-825/500, 9395-825/550

Terminal Function	Terminal	Function	Bus Landing	Tightening Torque Nm (lb ft)	Stud
AC Input to UPM Section	E1A (UPM 1) E1A (UPM 2) E1A (UPM 3) E1A (UPM 4)	Phase A	3 – stud mounting	14.2 (10.4)	M8
	E2A (UPM 1) E2A (UPM 2) E2A (UPM 3) E2A (UPM 4)	Phase B	3 – stud mounting	14.2 (10.4)	M8
	E3A (UPM 1) E3A (UPM 2) E3A (UPM 3) E3A (UPM 4)	Phase C	3 – stud mounting	14.2 (10.4)	M8
AC Output from UPM Section	E9A (UPM 1) E9A (UPM 2) E9A (UPM 3)	Phase A	3 – stud mounting	14.2 (10.4)	M8
	E10A (UPM 1) E10A (UPM 2) E10A (UPM 3)	Phase B	3 – stud mounting	14.2 (10.4)	M8
	E11A (UPM 1) E11A (UPM 2) E11A (UPM 3)	Phase C	3 – stud mounting	14.2 (10.4)	M8
	E12A (UPM 1) E12A (UPM 2) E12A (UPM 3)	Neutral	3 – stud mounting	14.2 (10.4)	M8
DC Input to UPM Section	1E4A (UPM 1) 2E4A (UPM 2) 3E4A (UPM 3)	Positive	6 – stud mounting (2 per UPM)	14.2 (10.4)	M8
	1E5A (UPM 1) 2E5A (UPM 2) 3E5A (UPM 3)	Negative	6 – stud mounting (2 per UPM)	14.2 (10.4)	M8

Table 3-10. Supplied Intercabinet Wiring Terminal Hardware Kit

Part	Size	Quantity	Terminals Used On	Eaton Part Number
Flat Washer	M8	36	UPM AC Input, UPM Battery Input, UPM AC Output, and Neutral	180500036-080
Conical Washer	M8	36	UPM AC Input, UPM Battery Input, UPM AC Output, and Neutral	180500037-080
Nut	M8	36	UPM AC Input, UPM Battery Input, UPM AC Output, and Neutral	180200001-05

For a UPS with common rectifier input terminals, E1 through E12 are 2-hole bus bar mountings for standard NEMA 2-hole barrel lugs. The power wiring connections for this equipment are rated at 90°C. See Table 3-11 for external power cable terminations, Table 3-12 for supplied external wiring terminal hardware, and Table 3-13 for recommended installation parts and tools not supplied by Eaton Corporation.

For a UPS with separate rectifier input terminals for the UPMs, E1 through E3 are pressure terminations, UL and CSA rated at 90°C. See Table 3-14 on page 3-21 for power cable terminations.

Figure 4-25 through Figure 4-33 starting on page 4-31 show the location of the power cable terminals inside the UPS.

Table 3-11. UPS External Power Cable Terminations for the Three UPM Eaton 9395-825/650, 9395-825/750, and 9395-825/825 and the Two UPM Eaton 9395-825/450, 9395-825/500, 9395-825/550

Terminal Function	Terminal	Function	Bus Landings (using both sides of bus)	Tightening Torque Nm (lb ft)	Bolt Size
AC Input to UPS Rectifier	E1	Phase A	4 – 2 bolt mounting	76 (56)	M12
	E2	Phase B	4 – 2 bolt mounting	76 (56)	M12
	E3	Phase C	4 – 2 bolt mounting	76 (56)	M12
AC Input to Bypass	E6	Phase A	6 – 2 bolt mounting	76 (56)	M12
	E7	Phase B	6 – 2 bolt mounting	76 (56)	M12
	E8	Phase C	6 – 2 bolt mounting	76 (56)	M12
AC Output to Critical Load	E9	Phase A	6 – 2 bolt mounting	76 (56)	M12
	E10	Phase B	6 – 2 bolt mounting	76 (56)	M12
	E11	Phase C	6 – 2 bolt mounting	76 (56)	M12
DC Input from Battery or Battery Disconnect to UPS – Common Battery	E4	Battery (+)	8 – 2 bolt mounting (2 UPM) 12 – 2 bolt mounting (3 UPM) 16 – 2 bolt mounting (4 UPM)	76 (56)	M12
	E5	Battery (-)	8 – 2 bolt mounting (2 UPM) 12 – 2 bolt mounting (3 UPM) 16 – 2 bolt mounting (4 UPM)	76 (56)	M12
DC Input from Battery or Battery Disconnect to UPS – Separate Battery (UPM 1)	E4	Battery (+)	4 – 2 bolt mounting	76 (56)	M12
	E5	Battery (-)	4 – 2 bolt mounting	76 (56)	M12
DC Input from Battery or Battery Disconnect to UPS – Separate Battery (UPM 2)	E4	Battery (+)	4 – 2 bolt mounting	76 (56)	M12
	E5	Battery (-)	4 – 2 bolt mounting	76 (56)	M12
DC Input from Battery or Battery Disconnect to UPS – Separate Battery (UPM 3)	E4	Battery (+)	4 – 2 bolt mounting	76 (56)	M12
	E5	Battery (-)	4 – 2 bolt mounting	76 (56)	M12
DC Input from Battery or Battery Disconnect to UPS – Separate Battery (UPM 4 FI-UPM)	E4	Battery (+)	4 – 2 bolt mounting	76 (56)	M12
	E5	Battery (-)	4 – 2 bolt mounting	76 (56)	M12
Input and Output Neutral	E12	Neutral	12 – 2 bolt mounting	22 (16)	M10
Customer Ground	Ground	Ground	15 – 1 bolt mounting	22 (16)	M10

NOTE Customer ground, sized in accordance with NEC Table 250.122, can be run in any conduit listed in Table 3-15 on page 3-22.
NOTE Bypass terminations are not applicable to IOM configurations.

Table 3-12. Supplied External Wiring Terminal Hardware Kit

Part	Size	Quantity	Terminals Used On	Eaton Part Number
Bolt, Grade 5	M10 x 25 mm	15	Ground	180190078-087
Bolt, Grade 5	M12 x 45 mm	92	Rectifier Input, Bypass Input, Battery Input, Output, and Neutral	180190078-113
Flat Washer	M10	15	Ground	180500036-100
Flat Washer	M12	184	Rectifier Input, Bypass Input, Battery Input, Output, and Neutral	180500036-120
Conical Washer	M10	15	Ground	180500037-100
Conical Washer	M12	92	Rectifier Input, Bypass Input, Battery Input, Output, and Neutral	180500037-120
Nut	M12	92	Rectifier Input, Bypass Input, Battery Input, Output, and Neutral	180200001-07

NOTE Bypass terminations are not applicable to IOM configurations.

Table 3-13. Recommended Installation Parts and Tools (Not Supplied by Eaton)

Part	Size	Quantity	Manufacturer	Part Number	Notes
Long Barrel 2-Hole Lug	2/0 AWG	As required	Thomas & Betts	54862BE	Copper wire only
	3/0 AWG		Thomas & Betts	54864BE	
	4/0 AWG		Thomas & Betts	54866BE	
	250 MCM		Thomas & Betts	54868BE	
	300 MCM		Thomas & Betts	54870BE	
	350 MCM		Thomas & Betts	54872BE	
	400 MCM		Thomas & Betts	54874BE	
	500 MCM		Thomas & Betts	54876BE	
Manual Hydraulic Crimp Tool	14 Ton	1	Thomas & Betts	TBM14M	
Die Set	N/A	1	Thomas & Betts	15506	

Table 3-14. Separate Rectifier Input UPM Power Cable Terminations for the Three UPM Eaton 9395-825/650, 9395-825/750, and 9395-825/825 and the Two UPM Eaton 9395-825/450, 9395-825/500, 9395-825/550

Terminal Function	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb ft)	Type Screw
AC Input to each UPM Rectifier	E1	Phase A	2 - #6-250 kcmil	42.4 (375)	5/16″ Hex
	E2	Phase B	2 - #6-250 kcmil	42.4 (375)	5/16″ Hex
	E3	Phase C	2 - #6-250 kcmil	42.4 (375)	5/16″ Hex

Table 3-15. Power Cable Conduit Requirements (continued)

UPS Model	Voltage	Terminal	Number of Wires in Conduit	Minimum Conduit Trade Size	Number of Conduits
Eaton 9395-825/825	400 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	3	5
		AC Input to UPS Rectifier (Separate Feed) (A, B, C, Ground)	4	2	3 (Each UPM)
		AC Input to Bypass and Output (Four Wire) (A, B, C, Ground)	4	3	4
		AC Input to Bypass and Output (Five Wire) (A, B, C, Neutral, Ground)	5	3	5
	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	3	4
		AC Input to UPS Rectifier (Separate Feed) (A, B, C, Ground)	4	2	2 (Each UPM)
		AC Input to Bypass and Output (Four Wire) (A, B, C, Ground)	4	3	4
		AC Input to Bypass and Output (Five Wire) (A, B, C, Neutral, Ground)	5	3	5
	DC	Battery (Positive, Negative, Ground)		See Note 1	
Eaton 9395-825/450 Eaton 9395-825/500 Eaton 9395-825/550 See Note 2	400 Vac	AC Input to UPS Rectifier (Separate Feed) (A, B, C, Ground)	4	2	3 (Each UPM)
		AC Input to Bypass and Output (Four Wire) (A, B, C, Ground)	4	3	4
		AC Input to Bypass and Output (Five Wire) (A, B, C, Neutral, Ground)	5	3	5
	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	3	4
		AC Input to UPS Rectifier (Separate Feed) (A, B, C, Ground)	4	2	2 (Each UPM)
		AC Input to Bypass and Output (Four Wire) (A, B, C, Ground)	4	3	4
		AC Input to Bypass and Output (Five Wire) (A, B, C, Neutral, Ground)	5	3	5
	DC	Battery (Positive, Negative, Ground)		See Note 1	

NOTE 1 Select conduit taking into consideration the DC input wire sizes listed in Table 3-4 on page 3-14, Table 3-5 on page 3-15, Table 3-6 on page 3-16 and Table 3-7 on page 3-17 the DC terminations listed in Table 3-11 on page 3-20, type of battery installation, and requirements from NEC Table 4, Electrical Metallic Tubing (EMT).

NOTE 2 Because of the future upgradability to a fully rated 825 kVA UPS with the addition of the FI-UPM, these conduit sizes are specified for an 825kVA UPS.

NOTE 3 Bypass conduit data is not applicable to IOM configurations.

External overcurrent protection and disconnect are not provided by this product, but are required by codes. See to Table 3-4 on page 3-14, Table 3-5 on page 3-15, Table 3-6 on page 3-16, Table 3-7 on page 3-17 or Table 3-8 on page 3-18 for wiring requirements. If an output lockable disconnect is required, it is to be supplied by the customer.

Table 3-16 lists the recommended rating for input circuit breakers.

Table 3-17 lists the recommended rating for input circuit breakers with separate rectifier inputs. A separate breaker is required for each UPM.

Table 3-16. Recommended Input Circuit Breaker Ratings

UPS Model	Input Rating		
	Load Rating	400V	480V
Eaton 9395-825/650	80% Rated	1600A	1200A
	100% Rated	1200A	1000A
Eaton 9395-825/750	80% Rated	1600A	1600A
	100% Rated	1600A	1200A
Eaton 9395-825/825	80% Rated	2000A	1600A
	100% Rated	1600A	1200A
Eaton 9395-825/450 Eaton 9395-825/500 Eaton 9395-825/550 See Note	80% Rated	2000A	1600A
	100% Rated	1600A	1200A

NOTE Because of the future upgradability to a fully rated 825 kVA UPS with the addition of the FI-UPM, these breaker sizes are specified for an 825 kVA UPS.

Table 3-17. Separate Rectifier Input Recommended Input Circuit Breaker Ratings

UPS Model	Input Rating for Each UPM		
	Load Rating	400V	480V
Eaton 9395-825/650 Eaton 9395-825/750 Eaton 9395-825/825	80% Rated	600A	500A
	100% Rated	500A	400A
Eaton 9395-825/450 Eaton 9395-825/500 Eaton 9395-825/550 See Note	80% Rated	600A	500A
	100% Rated	500A	400A

NOTE Because of the future upgradability to a fully rated 825 kVA UPS with the addition of the FI-UPM, these breaker sizes are specified for an 825 kVA UPS.

CAUTION

To reduce the risk of fire, connect only to a circuit provided with maximum input circuit breaker current ratings from Table 3-16 in accordance with the NEC, ANSI/NFPA 70.

The line-to-line unbalanced output capability of the UPS is limited only by the full load per phase current values for AC output to critical load shown in Table 3-4 on page 3-14, Table 3-5 on page 3-15, Table 3-6 on page 3-16, or Table 3-7 on page 3-17. The recommended line-to-line load unbalance is 50% or less.

Bypass and output overcurrent protection and bypass and output disconnect switches are to be supplied by the customer. Module Output Breakers (MOBs) are to be supplied by the customer. Table 3-18 lists the recommended rating for bypass, output, and MOB circuit breakers. Bypass breakers are not applicable for IOM configurations.

Table 3-18. Recommended Bypass, Output, and MOB Circuit Breaker Ratings

UPS Model	Bypass, Output, and MOB Rating		
	Load Rating	**400V**	**480V**
Eaton 9395-825/650	80% Rated	1200A	1000A
	100% Rated	1000A	800A
Eaton 9395-825/750	80% Rated	1600A	1200A
	100% Rated	1200A	1000A
Eaton 9395-825/825	80% Rated	1600A	1600A
	100% Rated	1200A	1000A
Eaton 9395-825/450 Eaton 9395-825/500 Eaton 9395-825/550 See Note 1	80% Rated	1600A	1600A
	100% Rated	1200A	1000A

NOTE 1 Because of the future upgradability to a fully rated 825 kVA UPS with the addition of the FI-UPM, these breaker sizes are specified for an 825 kVA UPS.
NOTE 2 Bypass breakers are not required for IOM configurations.

There is no manual DC disconnect device within the UPS.

A battery disconnect switch is required for battery systems and may also be required by NEC or local codes. The battery disconnect switch should be installed between the battery and the UPS.

External DC input overcurrent protection and disconnect switch is to be supplied by the customer. Table 3-19 and Table 3-20 list the maximum ratings for continuous-duty rated circuit breakers satisfying the criteria for both. Recommended disconnect size is based on a maximum full load discharge time less than 3 hours. For longer discharge times a larger disconnect may be required.

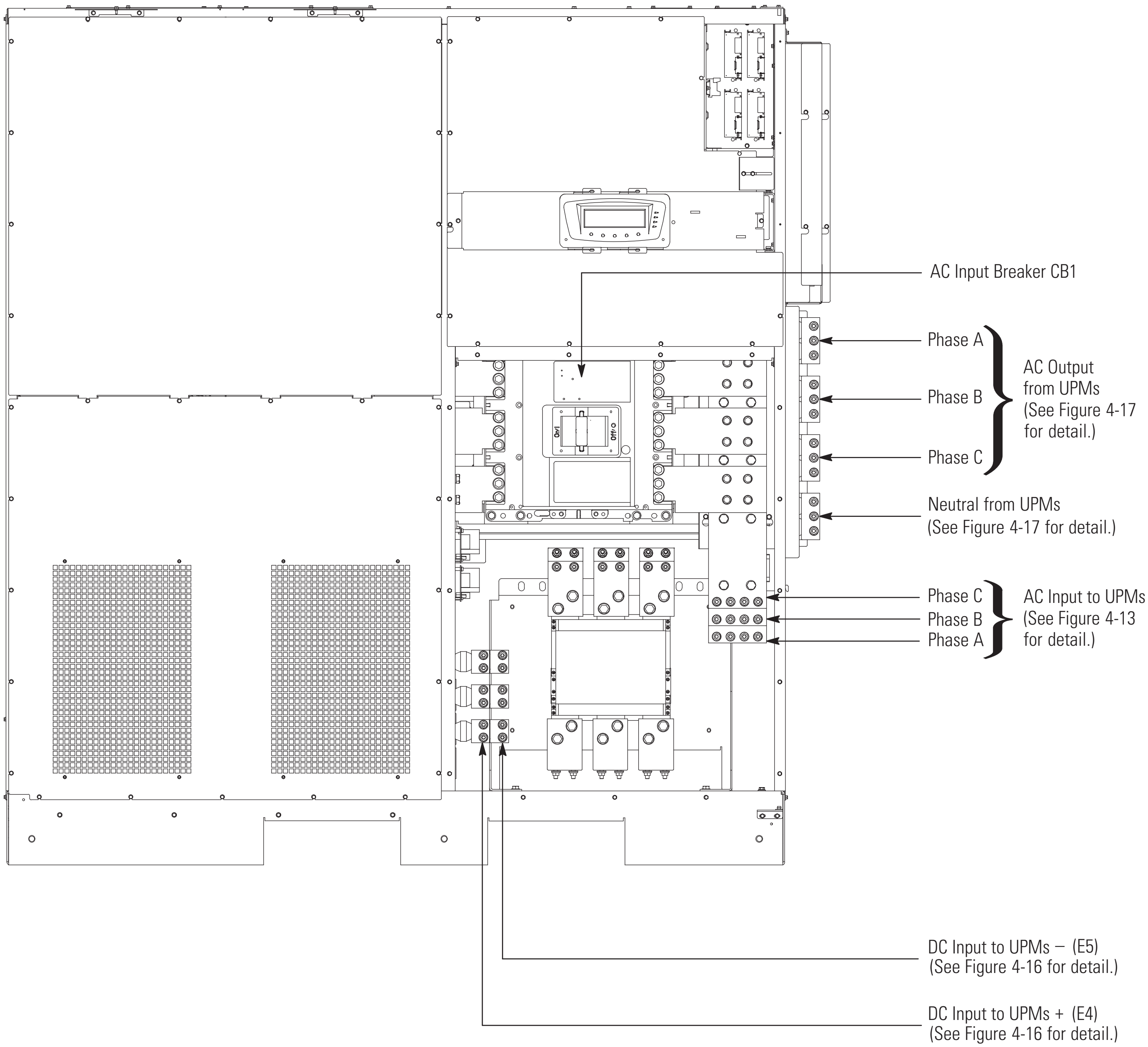
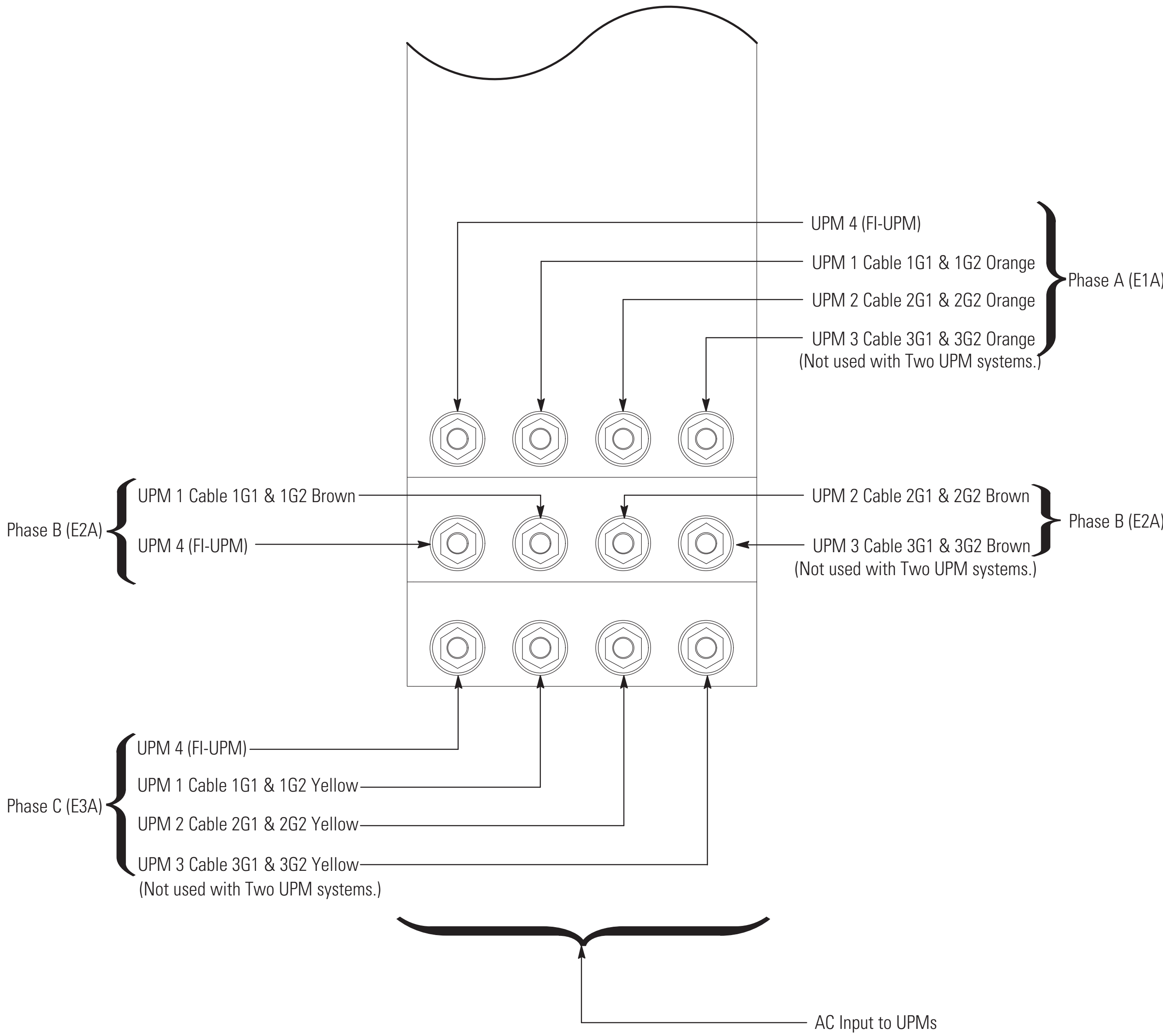


Figure 4-12. ISBM Section Intercabinet Power Terminal Locations – Common Rectifier Feed, Continuous Static Switch



NOTE *Two cable lugs will be connected to each terminal stud. When connecting the cable lugs, install the first lug on the stud with the raised barrel portion facing the back of the cabinet. Install the second lug with the raised barrel portion facing the front of the cabinet.*

Figure 4-13. ISBM Section Input Power Terminal Detail – Continuous Static Switch

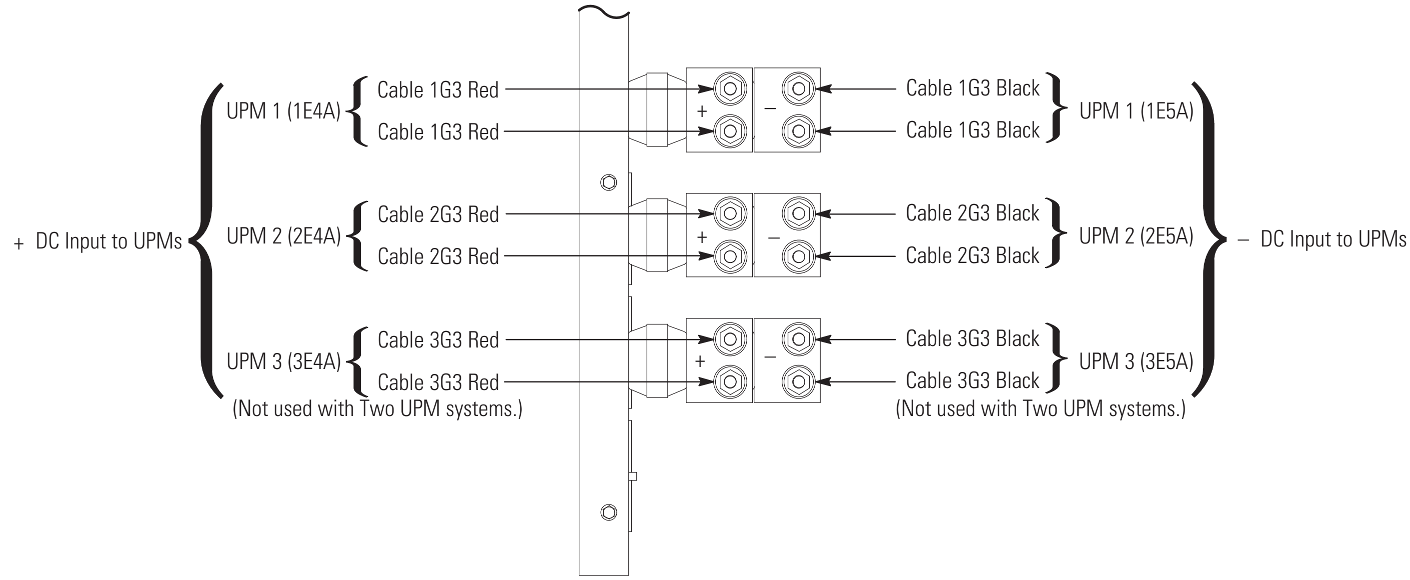
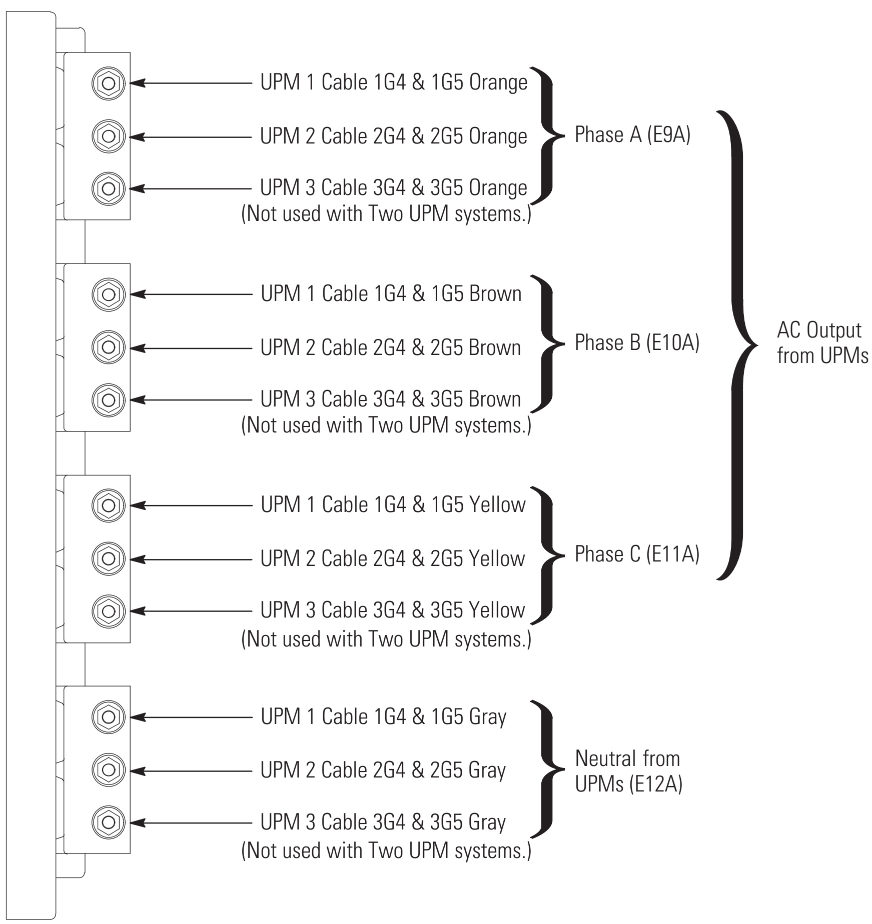


Figure 4-16. ISBM Section Battery Input Power Terminal Detail



NOTE *Two cable lugs will be connected to each terminal stud. When connecting the cable lugs, install the first lug on the stud with the raised barrel portion facing the back of the cabinet. Install the second lug with the raised barrel portion facing the front of the cabinet.*

Figure 4-17. ISBM Section Output Power Terminal Detail

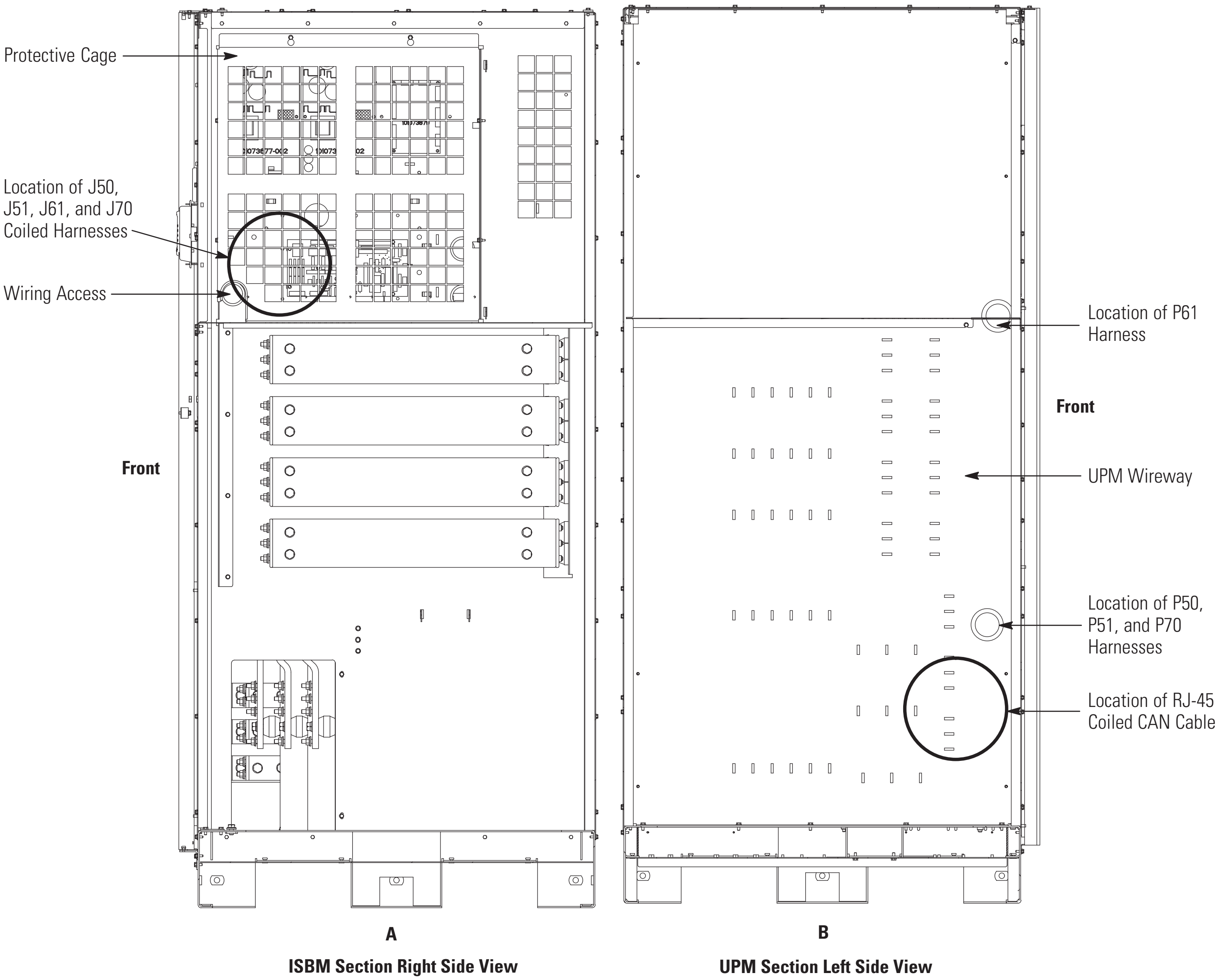
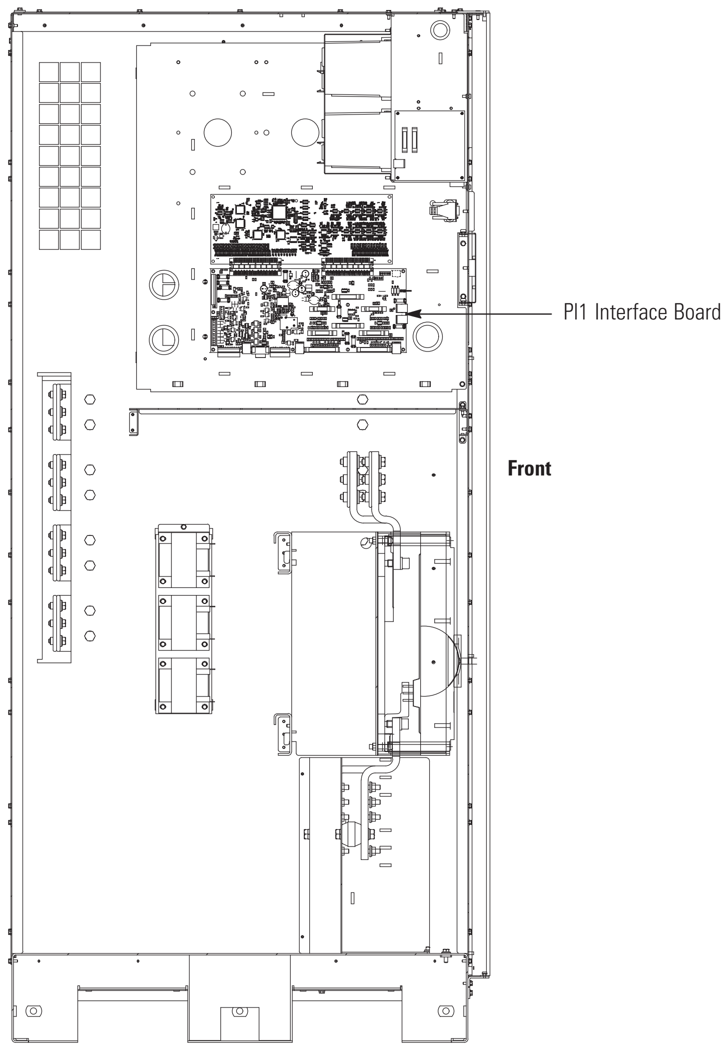


Figure 4-18. UPS Intercabinet Interface Harness Locations



ISBM Section Right Side Inside View

Figure 4-19. PI1 Interface Board Location

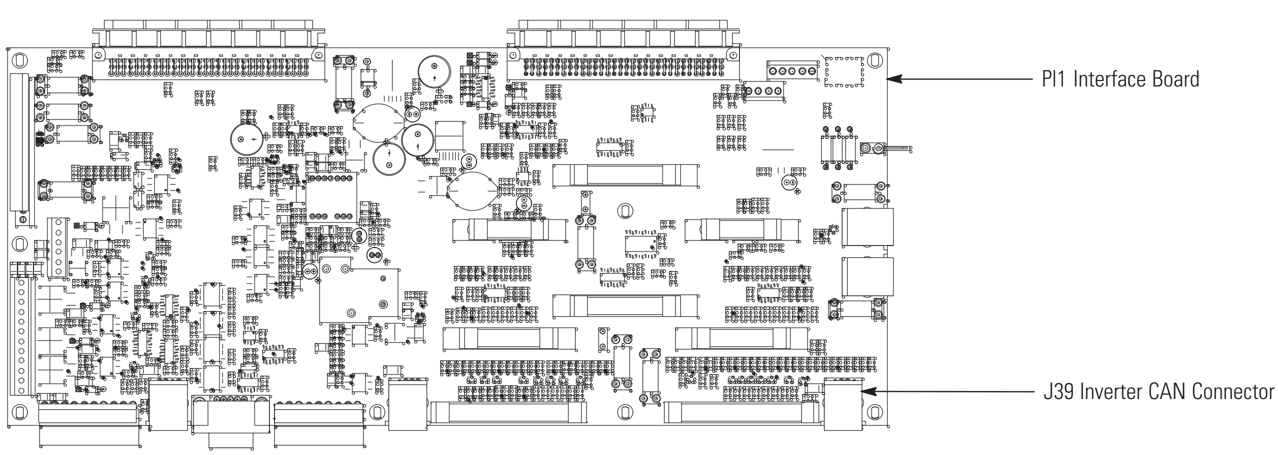


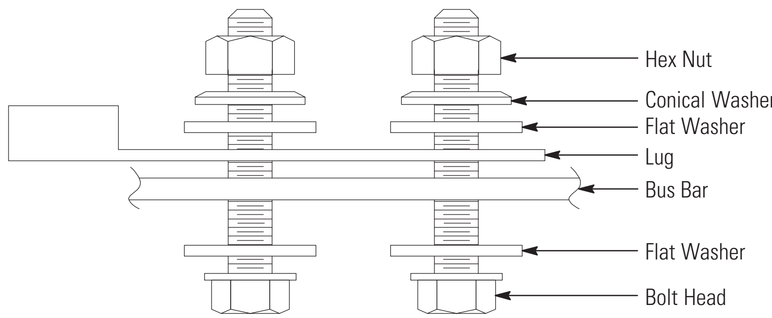
Figure 4-20. J39 Location on PI1 Interface Board

Use the procedures in the following paragraphs to connect the external and battery power wiring.

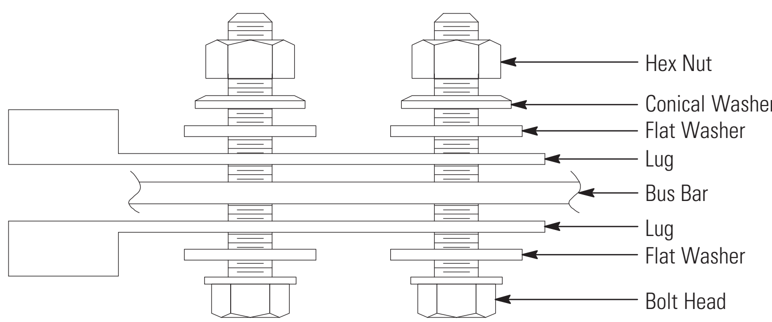
4.8.1 2-Hole Barrel Lug Terminations to Bus Bar Installation

Paragraphs 4.8.2 and 4.8.3 require connecting input, output, and battery power wiring using 2-hole barrel lugs. See Figure 4-21 for the hardware sequence when installing the lugs to the bus bars. Tighten the nut to the torque value listed in Table 3-11.

NOTE *Conical washers are special purpose washers that look similar to flat washers, except for a slight conical shape. When installing conical washers, the top of the dome should be next to the nut and the base of the washer should be against a flat surface such as a bus bar, flat washer, or large terminal.*



Single Lug Installation



Double Lug Installation

Figure 4-21. Typical Bus Bar Barrel Lug Mounting – Hardware Assembly Sequence

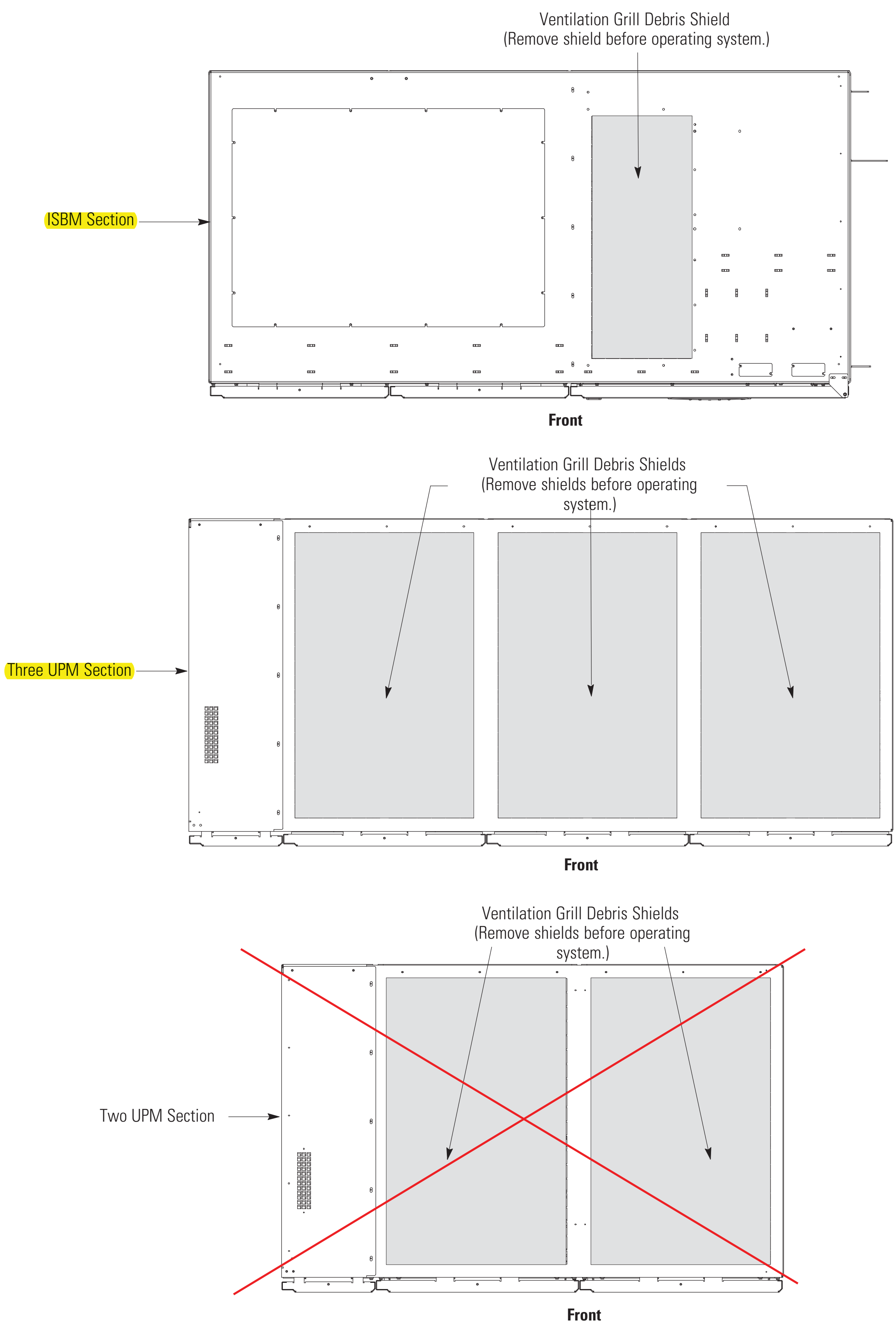


Figure 4-22. ISBM and UPM Section Debris Shields

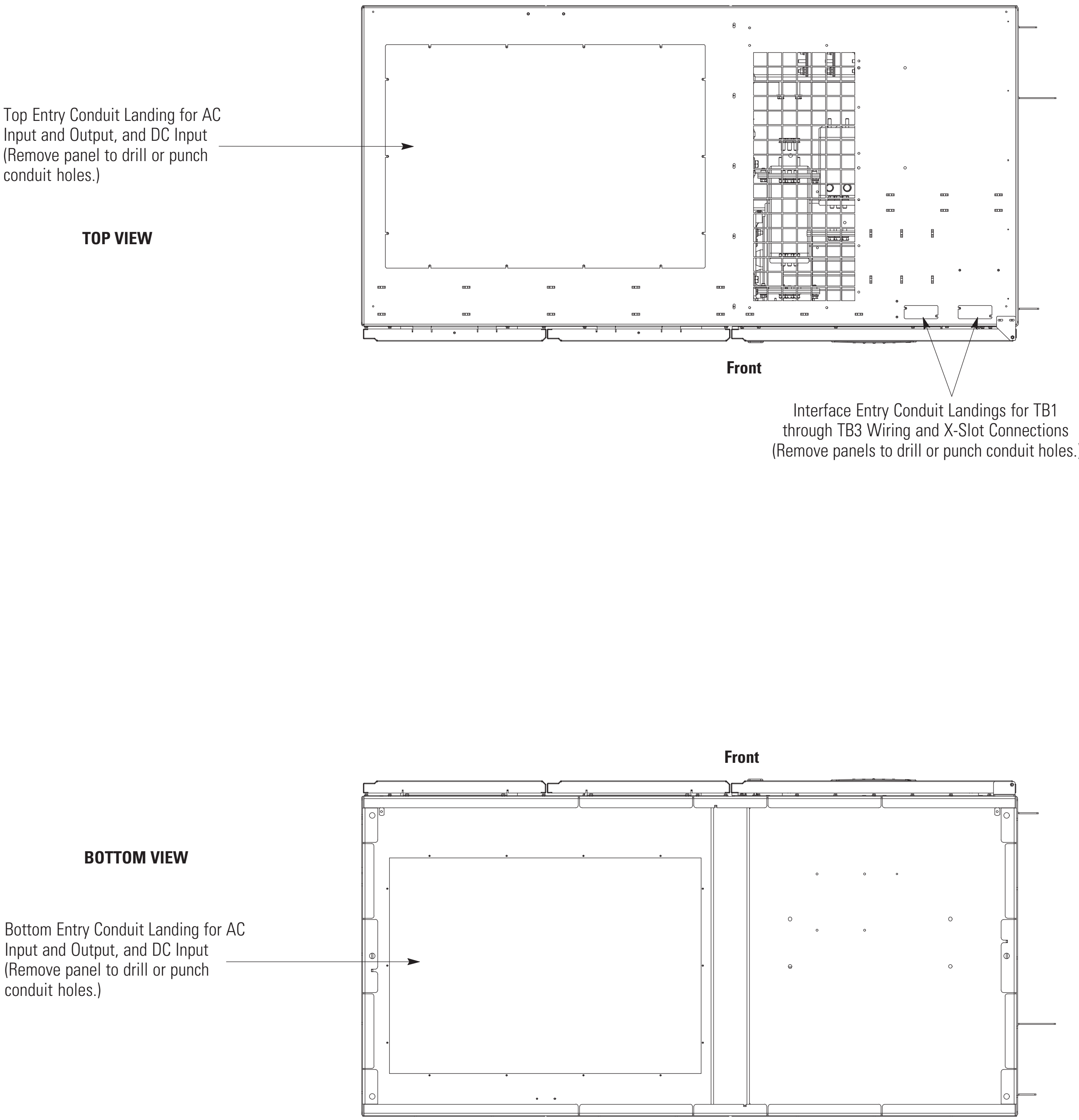
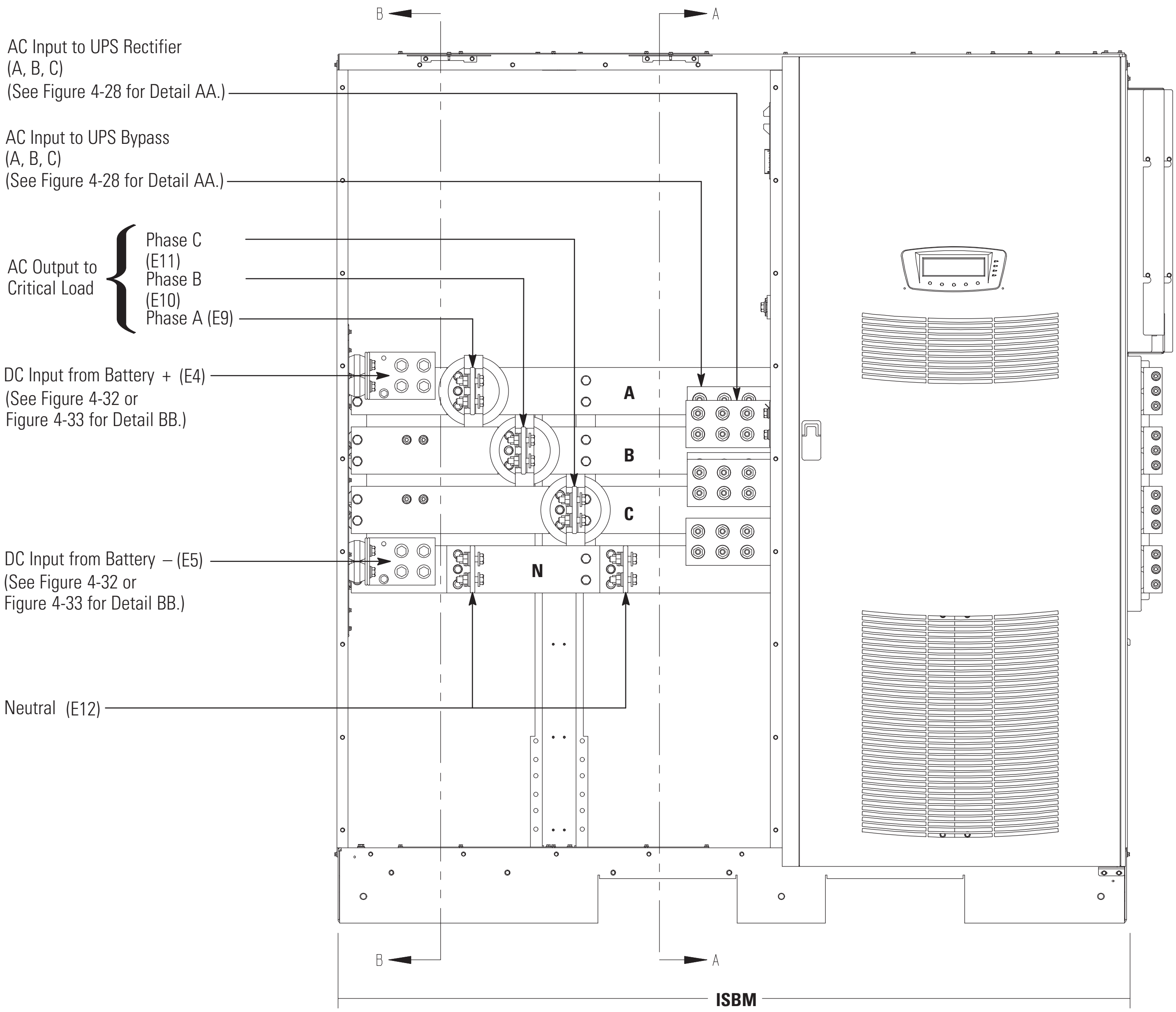


Figure 4-23. ISBM Section Conduit and Wire Entry Locations



NOTE *AC Input to Bypass terminals are not applicable to an IOM configuration.*

Figure 4-27. ISBM Section Power Terminal Locations – Common Rectifier Feed, Continuous Static Switch

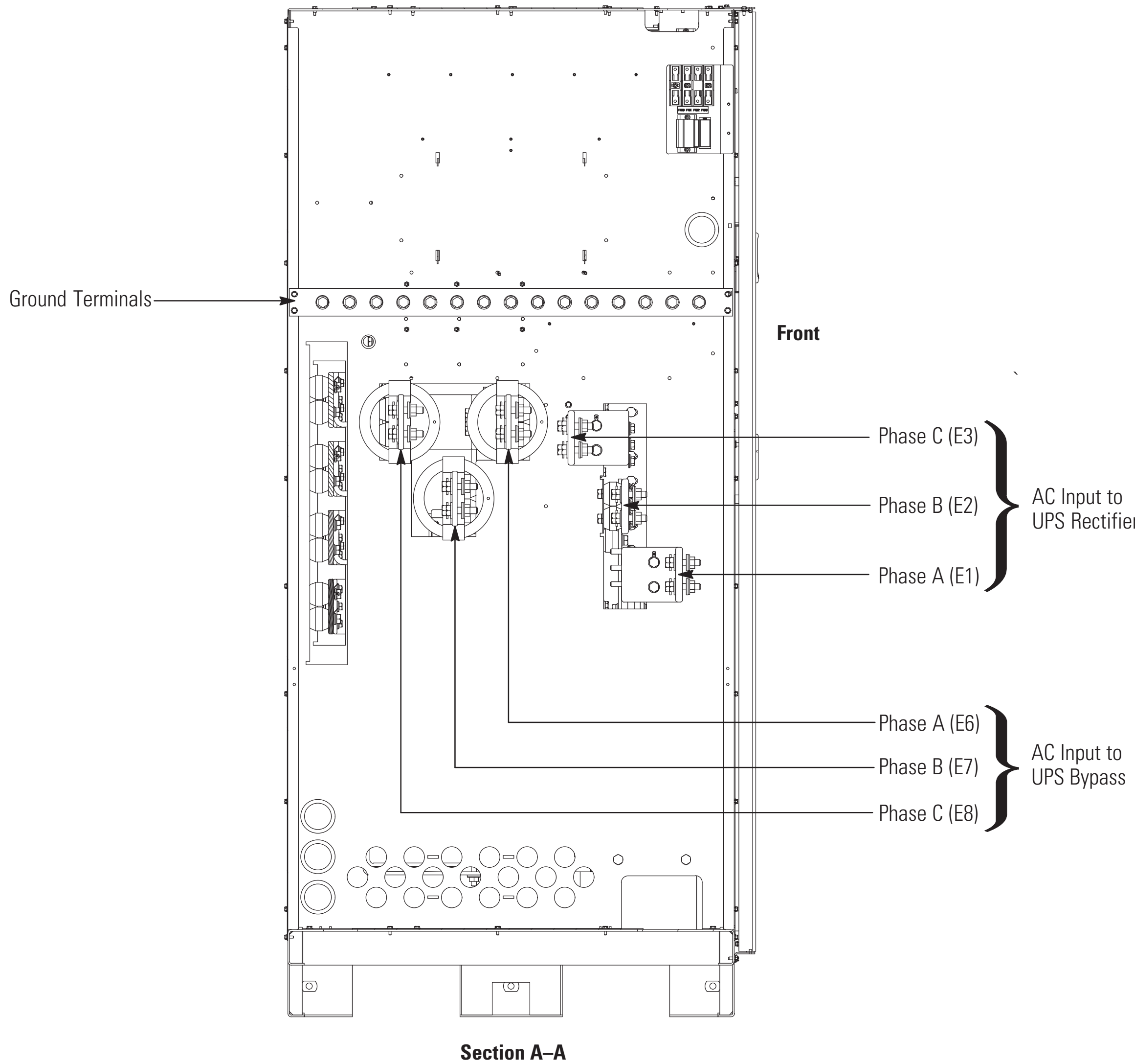


Figure 4-28. ISBM Section Power Terminal Detail AA – Common Rectifier Feed, Continuous Static Switch

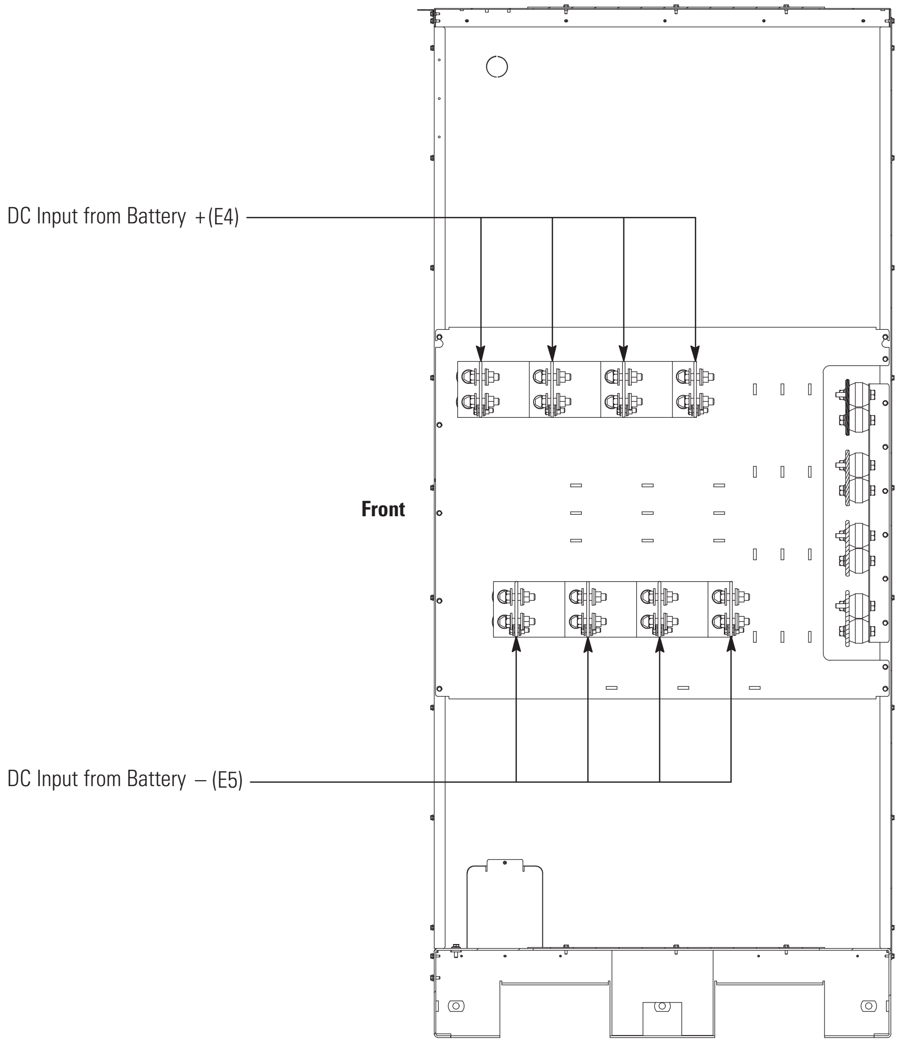


Figure 4-32. ISBM Section Power Terminal Detail BB – Common Battery

11. Reinstall the front door removed in Step 3 and secure with the retained hardware.

12. Close the door and secure the latch.

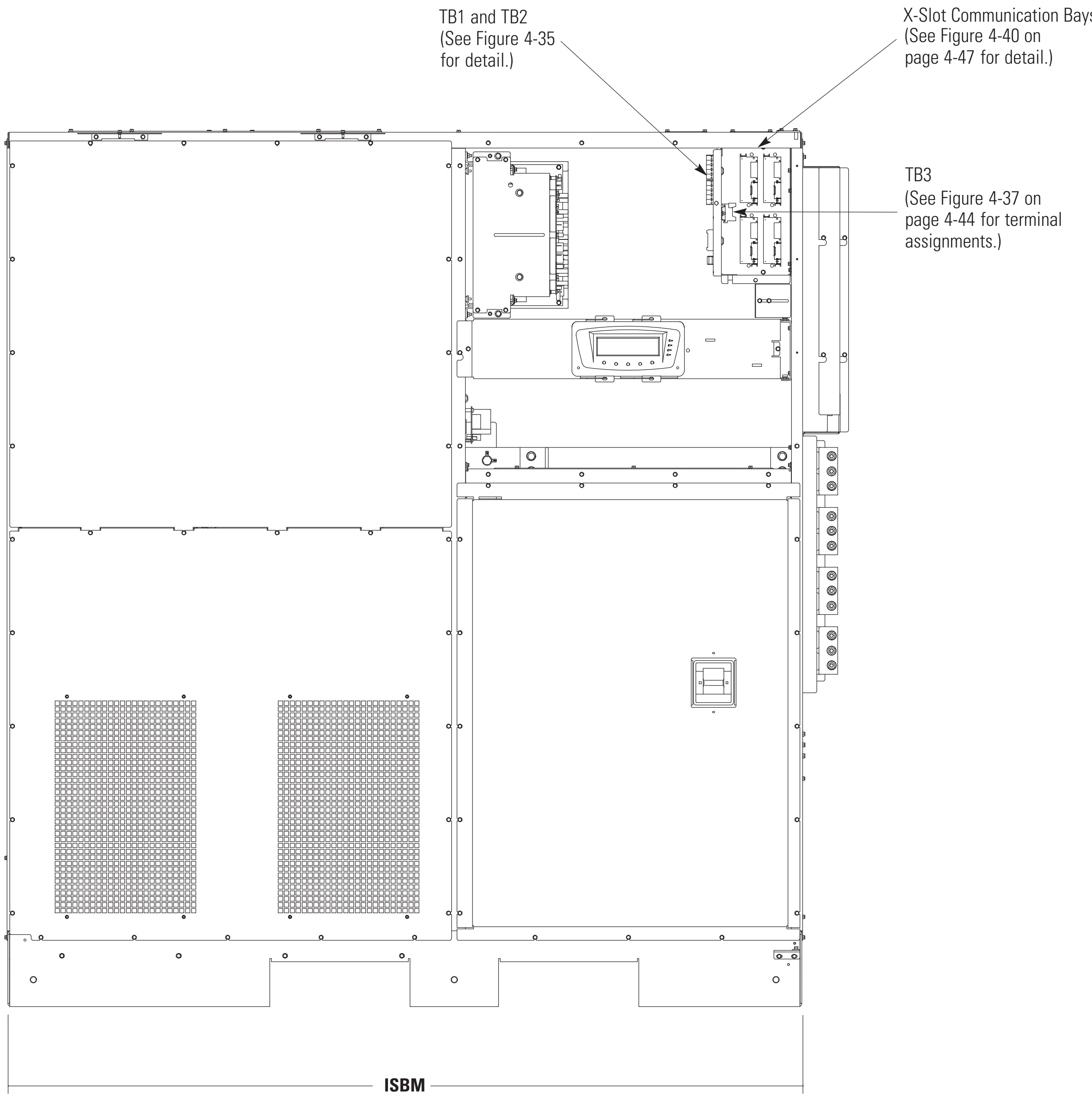


Figure 4-34. ISBM Section Interface Terminal Locations

Table 4-1. TB1, TB2, and TB3 Interface Connections

Terminal TB1	Name	Description
1	REPO NC	Input: Normally-closed dry contact used to activate UPS EPO from a remote switch.
2	REPO Return	
3	REPO NO	Input: Normally-open dry contact used to activate UPS EPO from a remote switch.
4	REPO Return	
5	Battery Aux	Input: Normally-open contact used to indicate when UPS battery breaker is open or closed.
6	Battery Aux Common	
7	48 Vdc Battery Shunt Trip +	Output: Contacts used to open battery breaker or disconnect.
8	48 Vdc Battery Shunt Trip –	
9	Output Contactor K3 NC Aux	Output: Normally-closed contact opens when output contactor closes.
10	Output Contactor K3 NC Aux Common	
Terminal TB2	**Name**	**Description**
1	Pull Chain	Output: Backup control for parallel operation.
2	Pull Chain Common	
3	Alarm Relay NC	Output: General purpose normally-closed (NC) relay contact.
4	Alarm Relay Common	
5	Alarm Relay NO	Output: General purpose normally-open (NO) relay contact.
6	Alarm Relay Common	
7	Not Used	
8	Not Used	
9	Not Used	
10	Not Used	
Terminal TB3	**Name**	**Description**
1	Building Alarm 1	Input: Programmable UPS alarm, activated by a remote dry contact closure.
2	Building Alarm 1 Return	
3	Building Alarm 2	Input: Programmable UPS alarm, activated by a remote dry contact closure.
4	Building Alarm 2 Return	
5	Building Alarm 3 Default: Charger Off	Input: Programmable UPS alarm, activated by a remote dry contact closure. Default function set for charger off.
6	Building Alarm 3 Return	
7	Building Alarm 4 Default: On Generator	Input: Programmable UPS alarm, activated by a remote dry contact closure. Default function set for on generator.
8	Building Alarm 4 Return	
9	Building Alarm 5 Default: Maintenance Bypass	Input: Programmable UPS alarm, activated by a remote dry contact closure. Default function set for maintenance bypass.
10	Building Alarm 5 Return	

NOTE “Return“ indicates connection to electronics circuit ground. “Common” indicates connection to common side of isolated relay contact.

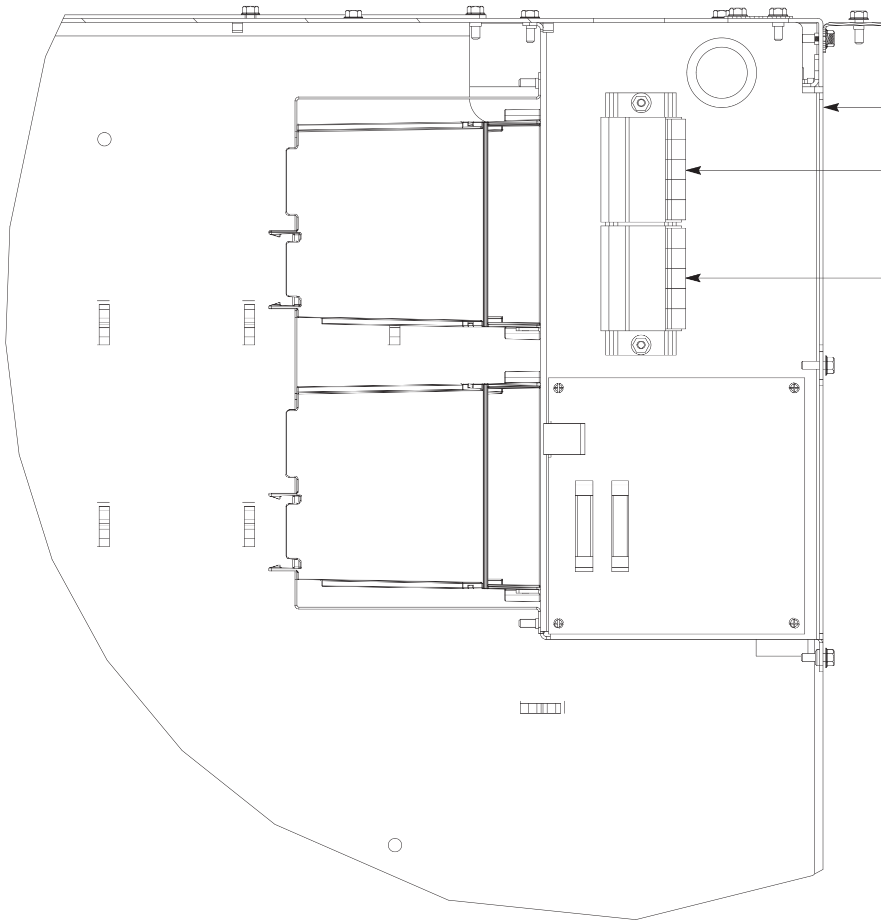
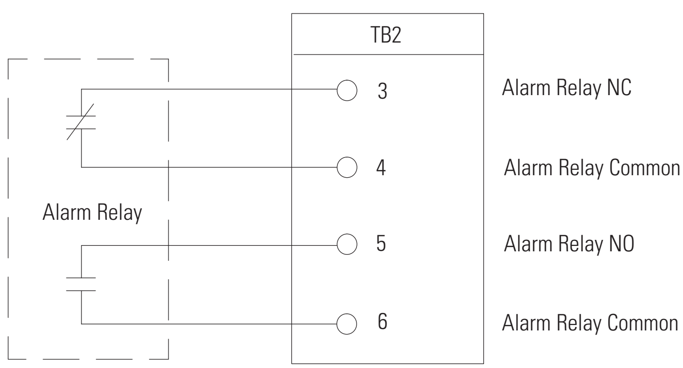


Figure 4-35. Interface Terminal Detail



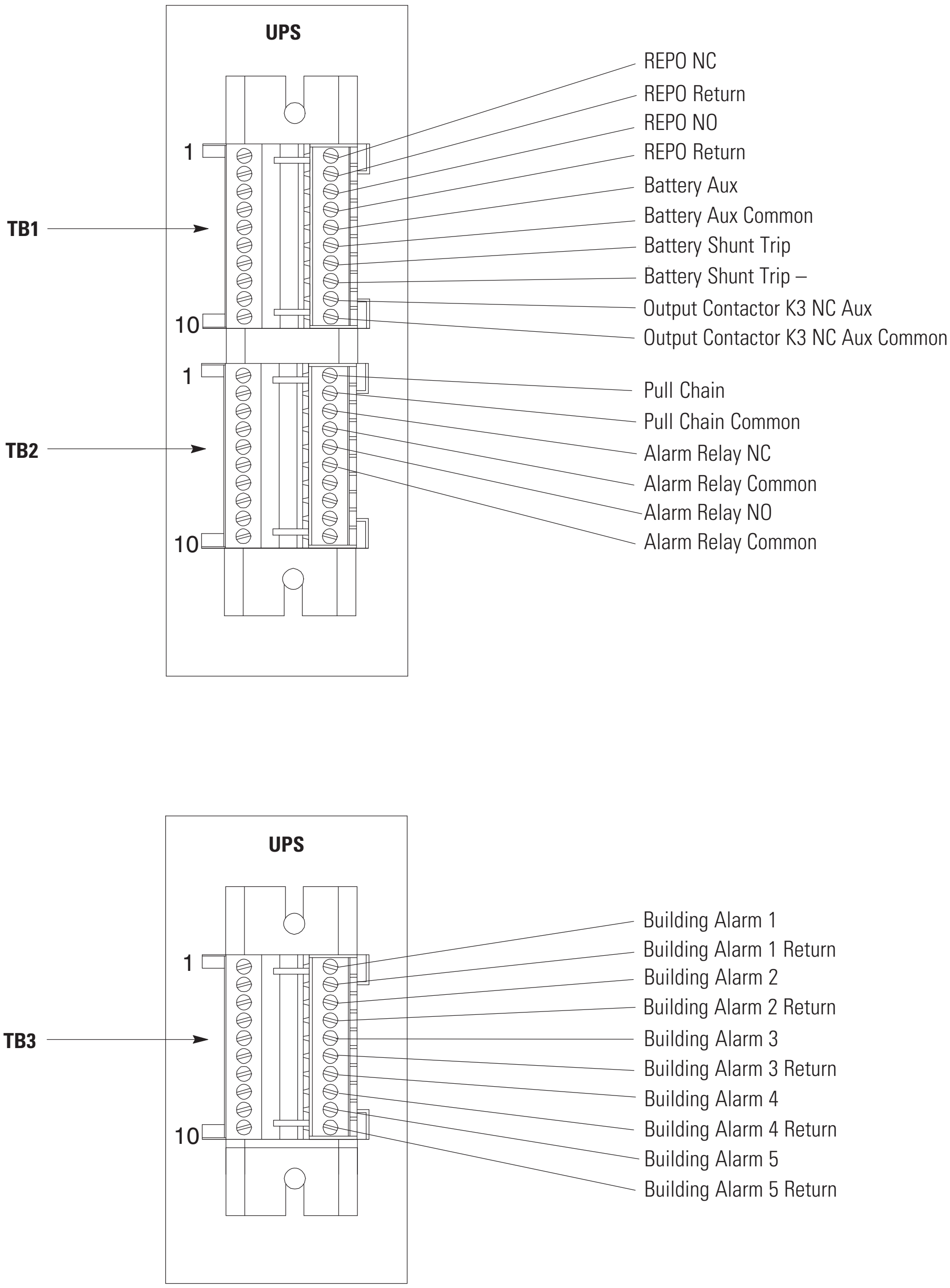
NOTE *Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac and 28 Vdc.*

NOTE *Alarm relay normally-open and normally-closed return terminals are separated on the terminal board but are electrically in common.*

NOTE *Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.*

NOTE *Alarm relay wiring should be a minimum of 22 AWG.*

Figure 4-36. Typical Alarm Relay Connection

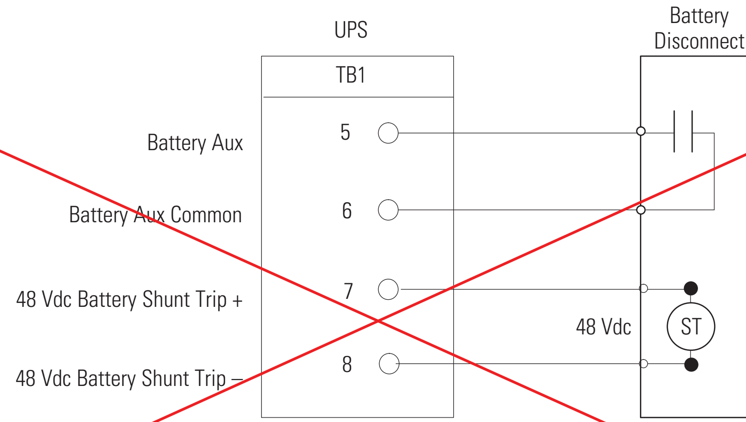


NOTE *All building alarm inputs require an isolated normally-open or normally-closed contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal as shown. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts. All control wiring and relay and switch contacts are customer-supplied.*

NOTE *The building alarms can be programmed to display the alarm functional name.*

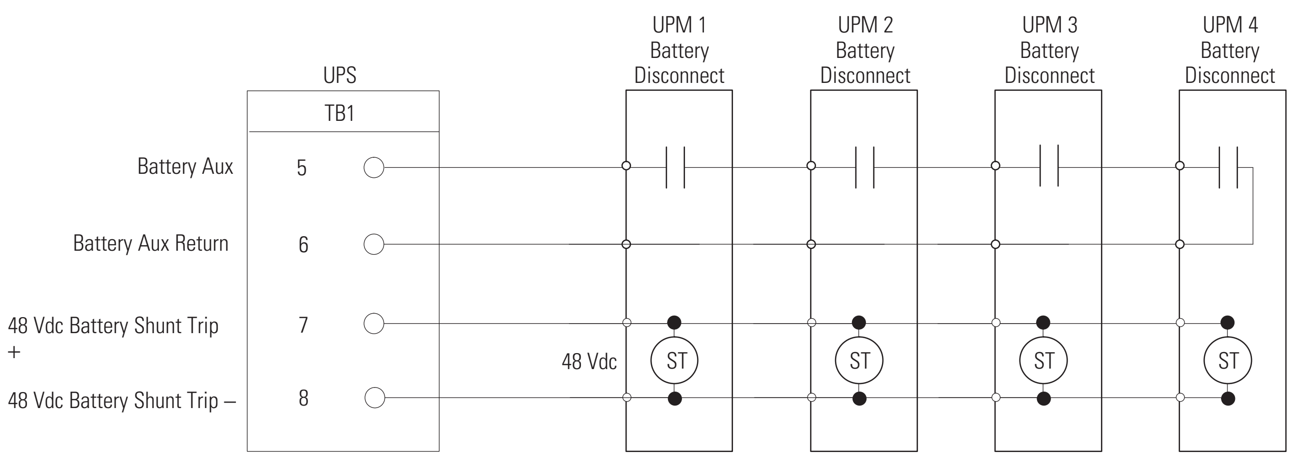
NOTE *A jumper wire must be connected between pins 1 and 2 on TB1, if the normally-closed REPO contact is not used.*

Figure 4-37. Terminal Blocks TB1, TB2, and TB3 Connector Assignments



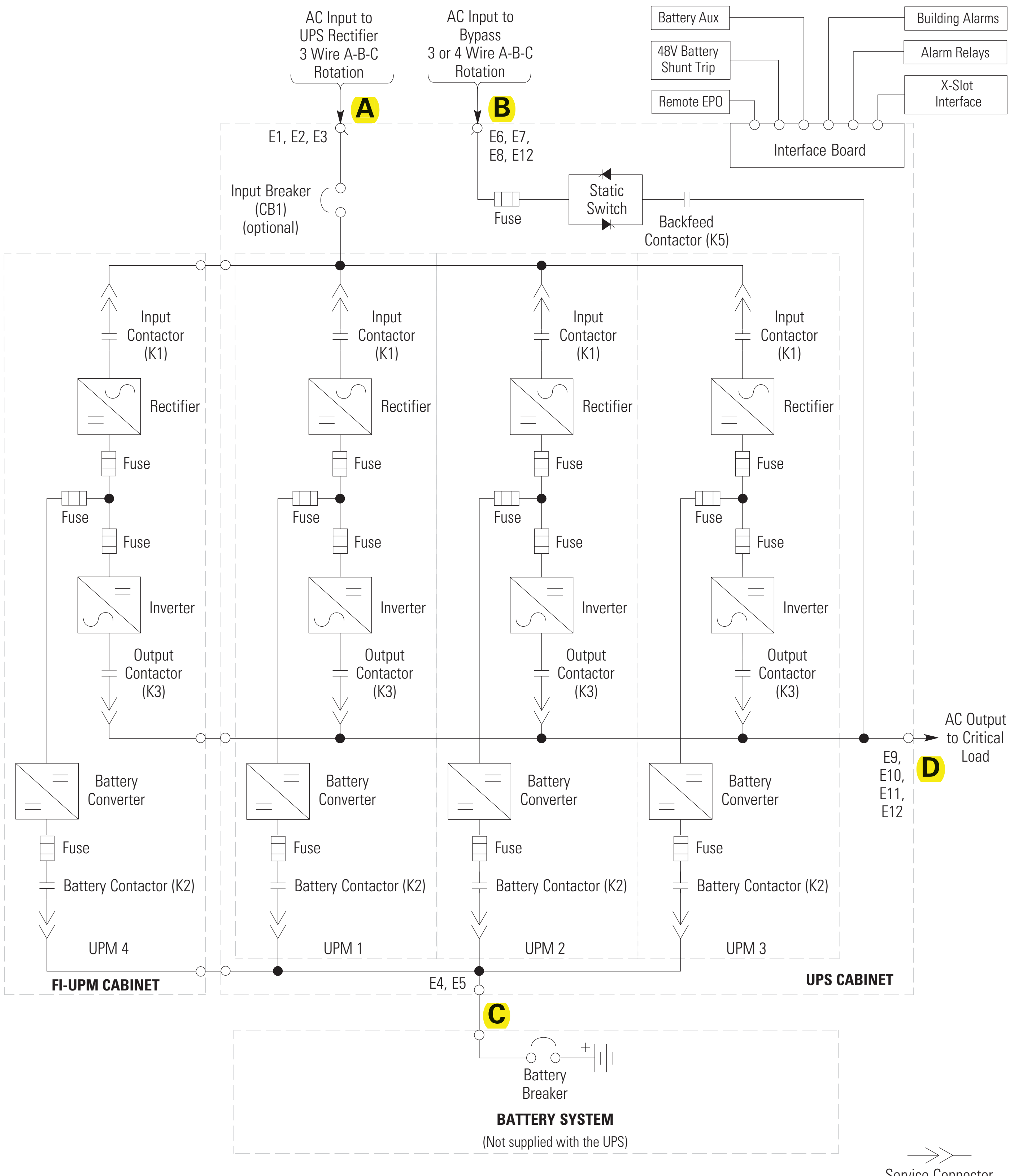
NOTE *Battery aux and DC shunt trip wiring should be a minimum of 18 AWG.*

Figure 4-38. Typical Battery Interface Connection – Common Battery System



NOTE *Battery aux and DC shunt trip wiring should be a minimum of 18 AWG.*

Figure 4-39. Typical Battery Interface Connection – Separate Battery System



NOTE *Callout letters **A**, **B**, **C**, and **D** map to Table 3-4 on page 3-14.*

NOTE *If the load requires a neutral, a bypass source neutral must be provided. If the load does not require a neutral and there is no neutral conductor connected at the bypass input, a neutral to ground bonding jumper must be installed. DO NOT install both a source neutral and a bonding jumper.*

Figure 6-11. Plus 1 UPS System – Four UPM, Common Rectifier Feed, Common Battery, Dual-Feed Configuration, Continuous Static Switch



Figure 7-2. UPS Controls and Indicators – Continuous Static Switch

7.1.1 Control Panel

The control panel is used to set up and control the UPS, and to monitor UPS operation. For a description of the UPS control panel functions, see paragraph 7.2.

7.1.2 Circuit Breakers

Optional circuit breaker (CB1) is used to control the AC input to the UPS rectifier. CB1 is not available with the separate UPM rectifier feed configuration.

- Do not dispose of batteries in a fire. Batteries may explode when exposed to flame.
- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

9.2 Performing Preventive Maintenance

The UPS system requires very little preventive maintenance. However, the system should be inspected periodically to verify that the units are operating normally and that the batteries are in good condition.

9.2.1 DAILY Maintenance

Perform the following steps daily:

1. Check the area surrounding the UPS system. Ensure the area is not cluttered, allowing free access to the unit.
2. Ensure the air intakes (vents on the front door or panels) and the exhaust openings (on top of the UPM section) are not blocked.
3. Ensure the operating environment is within the parameters specified in paragraph 3.2.1 on page 3-1 and Chapter 10, "Product Specifications."
4. Ensure the UPS is in Online mode (Online status indicator is illuminated). If an alarm lamp is illuminated or the Online status indicator is not illuminated, contact an Eaton service representative.

9.2.2 MONTHLY Maintenance

Perform the following steps monthly:

1. Monitor system parameters as described in paragraph 7.2, "Using the Control Panel," on page 3-1.
2. Check the UPS air filters (located behind the front panels or door) and wash or replace as necessary. See Figure 9-1 or Figure 9-2 and Figure 9-3 or Figure 9-4 for filter locations, and Table 9-1 for filter sizes. Contact an Eaton service representative for replacement filters. To remove the filters:

Table 9-1. UPS Filter Sizes

Filter Location	SIze
Bottom Left ISBM Section Air Filters (Momentary Static Switch and Continuous Static Switch)	12″ × 20″ × 0.25″
Bottom Right ISBM Section Air Filters (Continuous Static Switch only)	12″ × 20″ × 0.25″
Middle Right ISBM Section Air Filter (Continuous Static Switch only)	20″ × 6.3″ × 0.25″
UPM Section Air Filters	20″ × 44″ × 0.25″

CAUTION

Verify washed filters are thoroughly dry before reinstalling.

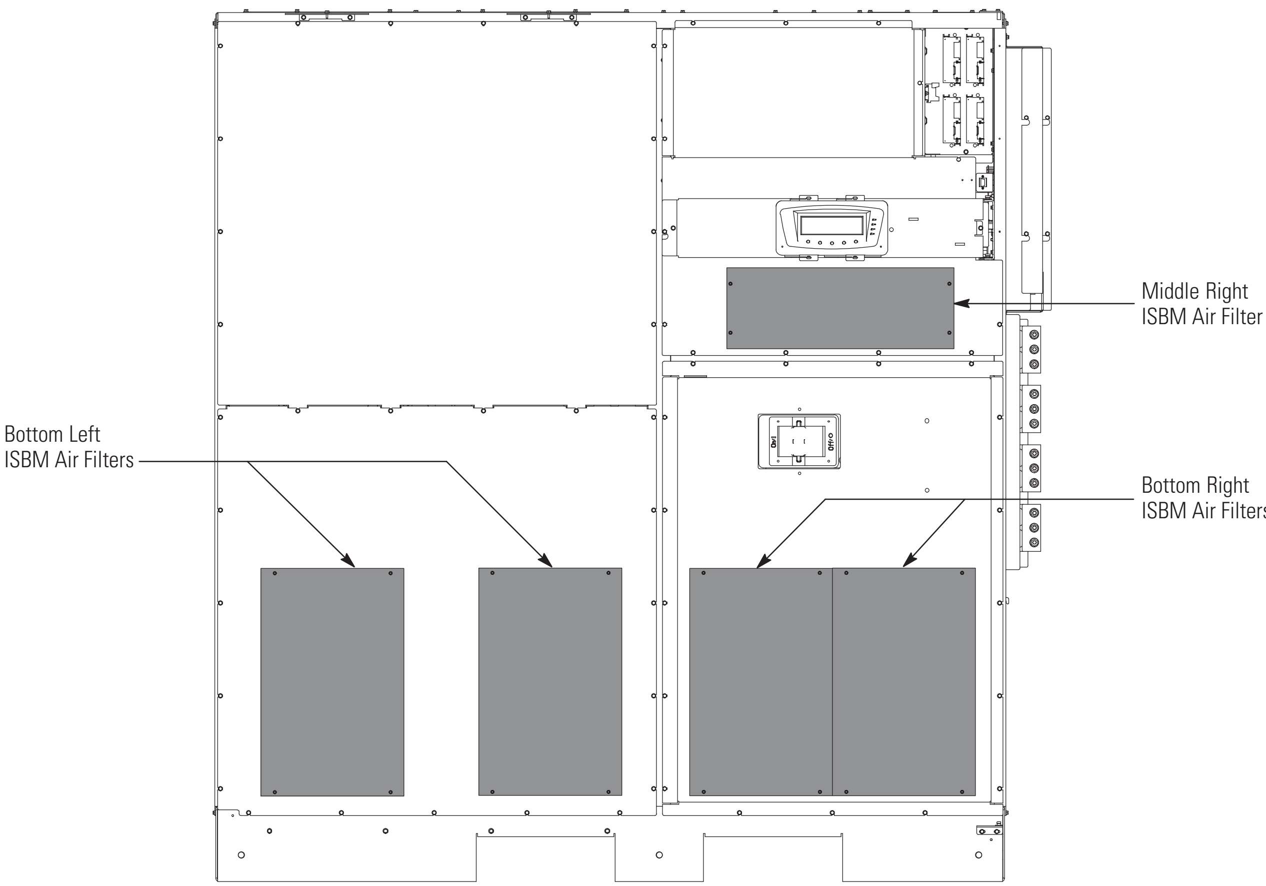


Figure 9-2. ISBM Section Air Filter Locations – Continuous Static Switch

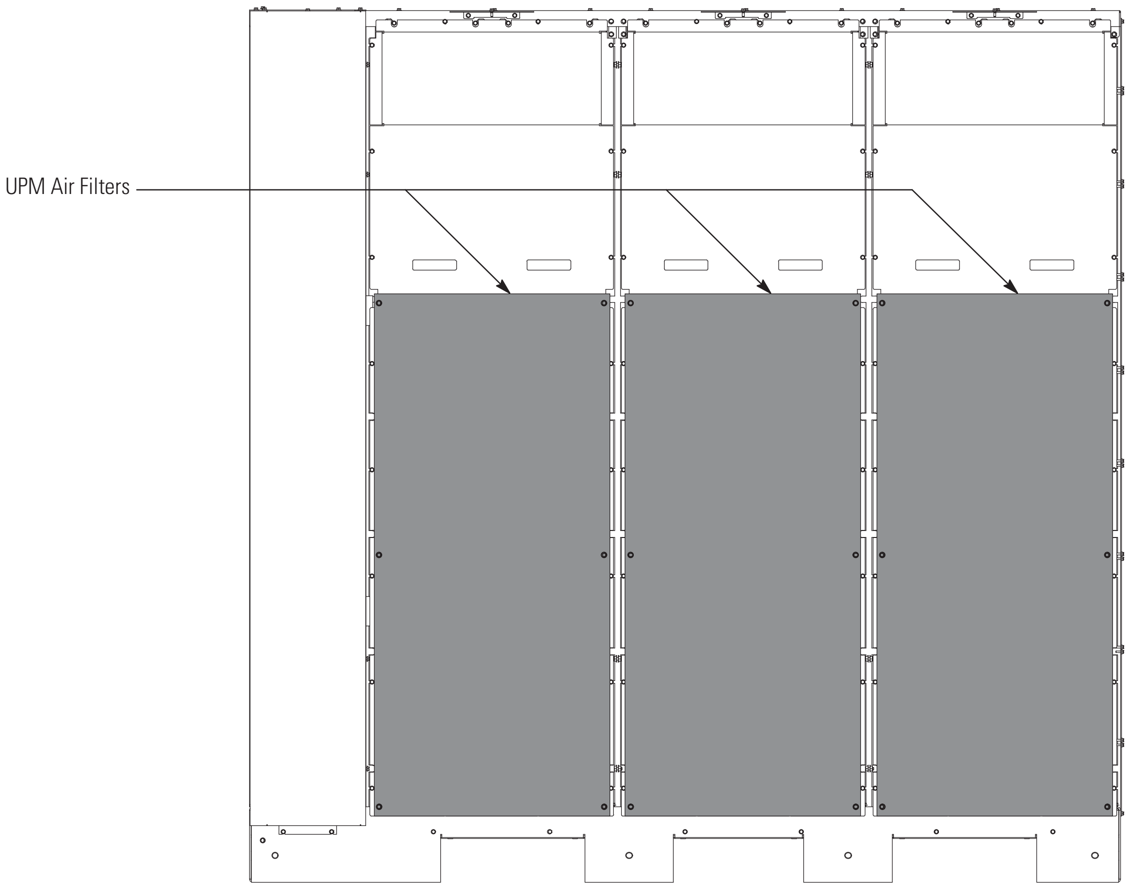


Figure 9-4. Three UPM Section Air Filter Locations

3. If the UPS is a Plus 1 or a two UPM model, check the Field Installed UPM (FI-UPM) air filter (located behind the front panel) and wash or replace as necessary. See Figure 9-5 for the filter location. The FI-UPM filter size is 20" × 44" × 0.25". Contact an Eaton service representative for a replacement filter. To remove the filter:

   a. Remove one top screw and two bottom screws securing the FI-UPM front panel (refer to the *Eaton 9395 Field Installed UPM Mechanical Installation Manual* listed in paragraph 1.8 on page 1-10.). Lift the panel straight up to remove it from the panel hanger bracket at the top of the cabinet.

   b. Pull the foam filter over the screw heads on the cabinet mounted studs and remove the filter from the cabinet.

CAUTION

Verify washed filter is thoroughly dry before reinstalling.

   c. Push the washed or new foam filter over the screw heads on the cabinet mounted studs until seated against the cabinet.

   d. Reinstall the FI-UPM front panel removed in Step a and secure with the retained hardware.

4. Record maintenance results and any corrective actions in a suitable log.

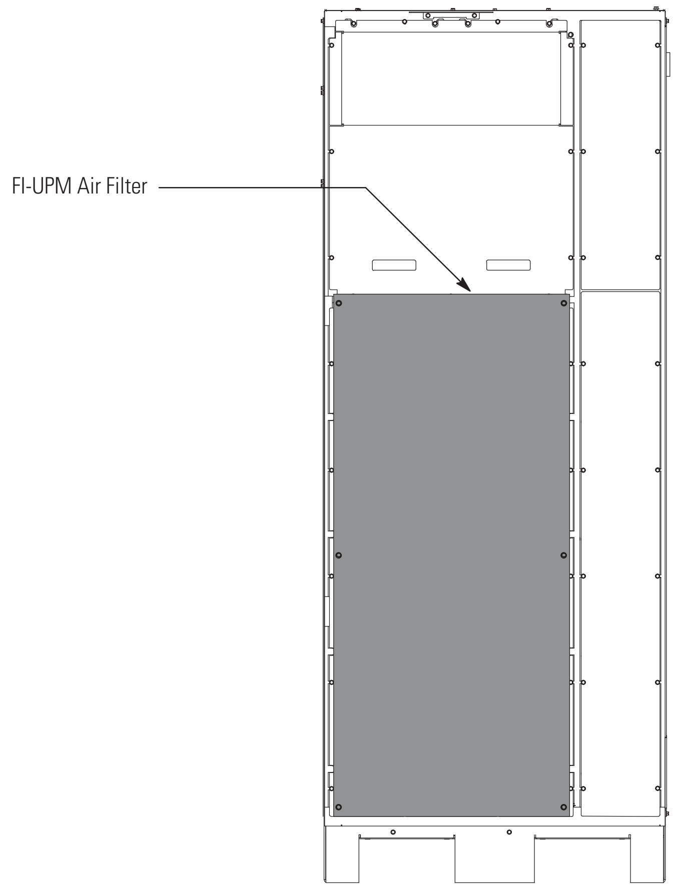


Figure 9-5. FI-UPM Air Filter Location

9.2.3 PERIODIC Maintenance

Periodic inspections of the UPS should be made to determine if components, wiring, and connections exhibit evidence of overheating. Particular attention should be given to bolted connections. Maintenance procedures should specify that the bolted connections be retorqued to values listed in this manual.

9.2.4 ANNUAL Maintenance

Annual preventive maintenance should be performed only by authorized service personnel familiar with maintenance and servicing of the UPS system. Contact an Eaton service representative for more information about service offerings.

9.2.5 BATTERY Maintenance

Contact an Eaton service representative for battery maintenance. Battery replacement and maintenance should be performed only by authorized service personnel.

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Eaton Power Xpert Gateway UPS Card



Eaton 9395 550 kVA

Delivers real-time, Web-enabled monitoring of Eaton® Uninterruptible Power Supplies

Product snapshot

- Real-time power monitoring presented how you need it – via standard on-board Web pages, Power Xpert Software or 3rd party network or building management systems
- Ethernet switch port allowing for daisy chaining of Ethernet communicating products
- Supports the Eaton Environmental Monitoring Probe

Powering Business Worldwide

Features/benefits

- **Web-enabled monitoring of power quality data -** Data can be viewed from any location with a Web browser
- **Data, event and system logging with time stamp -** Accurate logging for power quality analysis, log files can be exported in a CSV format to Excel to help generate reports
- **Modbus TCP/IP and SNMP v3 Support -** Open communication protocol facilitates integration with standard building management systems and network management systems
- **Intelligent email communications -** Two options for alarm and event email notification, individual emails or collective notification, providing the same information with a drastically reduced number of emails
- **Easy integration into existing Ethernet infrastructure** - Minimize installation cost
- **Netwatch shut-down client compatibility -** configure Netwatch directly in the PXGX card UI, set up UPS shutdown schedules, as well as UPS test and control.
- **Seamless integration of Eaton UPSs into Power Xpert® Software -** Web-enable and monitor all of your equipment, Eaton or other manufacturers, with the Power Xpert Architecture

Power monitoring in a networked world

Effective monitoring of the power system is critical to responding to events, preventing downtime and optimizing performance, which translates to greater reliability and cost efficiencies down the road.

The Power Xpert Gateway UPS Card (PXGX UPS) provides Web-enabled, real-time monitoring of Eaton uninterruptible power supplies (UPSs) through standard on-board Web pages, Power Xpert Software or third-party software. An integral part of the Power Xpert Architecture, which provides end-to-end power chain management, the PXGX UPS provides a central point to connect UPSs to an Ethernet network.

Develop baseline energy usage

Interval-based data history, event, and system logs can be viewed via Web browser, downloaded for review in MS Excel® or emailed to others for further analysis.

Securely view critical power data how and when you choose

Eaton provides the information needed to make critical power management decisions to keep the organization running effectively and efficiently.

You can rest assured that your information is secure when employing the PXGX UPS. It provides two levels of password authentication, thereby restricting access to Admin level for configuration separate from general use. For those seeking additional security, the PXGX UPS supports secure, Web-based communication via SSL.

Information is presented in organized, user-friendly Web pages. Device detail pages include real-time data such as:

- UPS Identification such as name, serial number, type
- UPS status
- UPS input current
- Input, inverter and output voltage
- Input and output frequency
- % full load
- Battery status
- Load segment status
- Output power
- Alarm status

Technical specifications

The Power Xpert Gateway UPS Card kit includes the following:

- Power Xpert Gateway UPS Card
- Local Configuration Cable
- Quick Start Guide

Ordering information

Catalog number	PXGXUPS
Style number	103007974-5591
Description	Power Xpert Gateway UPS Card for use with Eaton UPSs

Devices supported

Eaton uninterruptible power supplies with X-Slot® compatibility; these include the Eaton 9155, 9315, 9355, 9390, 9390IT, 9395, and BladeUPS®

Communication ports

Ethernet ports	Two RJ45 ports: supports 10/100BaseT for daisy chaining via integrated Ethernet switch
Serial ports	One USB port: supports local configuration and one RJ45 for optional connection to an Environmental Monitoring Probe (EMP)

Communication protocols supported

Web server	Supports data access from Web browsers (HTTP and HTTPS)
Modbus TCP/IP	Supports data access from Modbus TCP clients
SNMP v1 & v3	Supports common network management tools
SMTP	Supports email notification
NTP	Supports time synchronization via an NTP server for card and UPS synchronization
DHCP	Supports automatic IP address assignments, if enabled
IP v4 & v6	IP v4 and v6 compatibility

Supported MIBs

- Eaton Power MIB
- RFC 1628 UPS MIB
- Eaton EMP MIB
- Eaton alarms and traps MIB
- RFC 4133 Entity MIB
- RFC 4268 Entity State MIB; RFC 4268 Entity State MIB Part 2
- RFC 1213 MIB II

Web browsers supported

- IE 7 and 8
- Mozilla Firefox 2.0 and higher
- Google Chrome

Physical characteristics

Dimensions	12 cm x 11.4 cm x 3.9 cm (4.7" x 4.5" x 1.5")
Weight	200 grams (7.0 oz)

Environmental specifications

Ambient operating	0 to +40° C (32 to 104° F)
Relative humidity	10 to 80%, non-condensing
Altitude	10,000 ft
Enclosure rating	Indoor use only

Mounting configuration

X-Slot form factor fits directly into UPS chassis

Power supply

Nominal input voltage	12 VDC, unregulated (provided by UPS)
Input voltage range	8 – 25 VDC, unregulated

Power consumption

3.5 Watts

Regulatory/standards compliance

FCC Part 15, Class A	
CISPR 22, Class A	
ROHS compliant	
Telecom Conducted via EU Standard	EN 55022:1988+A1:2000+A2:2003, Class A/EN55022:1988+A1:2000+A2:2003

Note: Features and specifications listed in this document are subject to change without notice and represent the maximum capabilities of the software and products with all options installed. This is not a complete feature list. Features and functionality may vary depending on selected options.

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Finland: 358.94.52.661
France: 33.1.6012.7400
Germany: 49.0.7841.604.0
Italy: 39.02.66.04.05.40
Norway: 47.23.03.65.50
Portugal: 55.11.3616.8500
Sweden: 46.8.598.940.00
United Kingdom: 44.1753.608.700

ASIA PACIFIC
Australia: 61.2.9693.9366
New Zealand: 64.0.3.343.3314
China: 86.21.6361.5599
HK/Korea/Taiwan: 852.2745.6682
India: 91.11.2649.9414 to 18
Singapore/SEA: 65.6825.1668

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PX03FXA_TN
January 2011

Powering Business Worldwide

Eaton Environmental Monitoring Probe



Product Snapshot

Type:	Environmental monitoring device
Package Contents:	Main unit, User's guide, Double-sided Velcro tape
Compatibility:	10/100Mb ConnectUPS-X, ConnectUPS-BD and ConnectUPS-E with FW V3.01 and higher
Dimensions (LxWxH):	2.26 x 1.48 x 1.15 (inches) 57.6 x 37.6 x 29.3 (mm)
Weight:	1.19 oz. (34g)
Part Number:	116750224-001

Features

- Monitors temperature, humidity, and status of two contacts/sensors
- Works with any Eaton UPS with any ConnectUPS Web/SNMP card
- Compatible with PowerVision® Data Acquisition Terminal (DAT)
- Can be located up to 20 meters (65.6 feet) from the UPS
- Measures ambient temperatures between -20°C and 80°C
- Measures relatively humidity between 10 and 90 percent
- Displays status on Web page, IP phone or PDA, or network management system
- Supports user-defined thresholds for temperature, humidity, and contact closure status
- Supports graceful shutdown of affected equipment
- Auto-sends alarms via email, PCS phone, or pager
- Sends SNMP alarms to network management systems
- User Interface support for local languages (English, Chinese, Spanish, French, German, Italian, other)
- Two-year limited warranty, option for enhanced warranty (US and Canada)

The Eaton® Environmental Monitoring Probe (EMP) enables you to remotely monitor environmental conditions as easily as you monitor power conditions. Using a standard Web browser, you can view the ambient temperature and humidity of the remote environment, as well as the status of two additional contact devices, such as a smoke detector or open-door sensor.

Compatible with any Eaton UPS

The EMP can be used with any Eaton uninterruptible power system (UPS) equipped with any Powerware ConnectUPS Web/SNMP card (the device that connects the UPS to an Ethernet network or the Internet).

Simple, in-service installation

The EMP is connected to a communication port on the ConnectUPS card using standard CAT5 cable - and can be located up to 20m (65.6 feet) away.

Broad monitoring range

The EMP can monitor and measure temperatures between -20ºC and 80ºC, relative humidity between 10 and 90 percent, and contact state for two additional devices or sensors that are plugged into the EMP.

User-configurable alarm thresholds

An easy-to-use screen lets you define acceptable ranges for temperature and humidity, and normal contact closure status—and action to take during alarm conditions.

Real-time display of environmental conditions. Simply point your Web browser to the IP address of the ConnectUPS card for a display of current status. You can access this information from a PC, Internet-ready wireless device, or SNMP management software.

Automated notification of out-of-range conditions. When acceptable temperature or humidity limits are exceeded or contact status changes, the EMP automatically logs the event and notifies key personnel by email, PCS digital phone or pager.

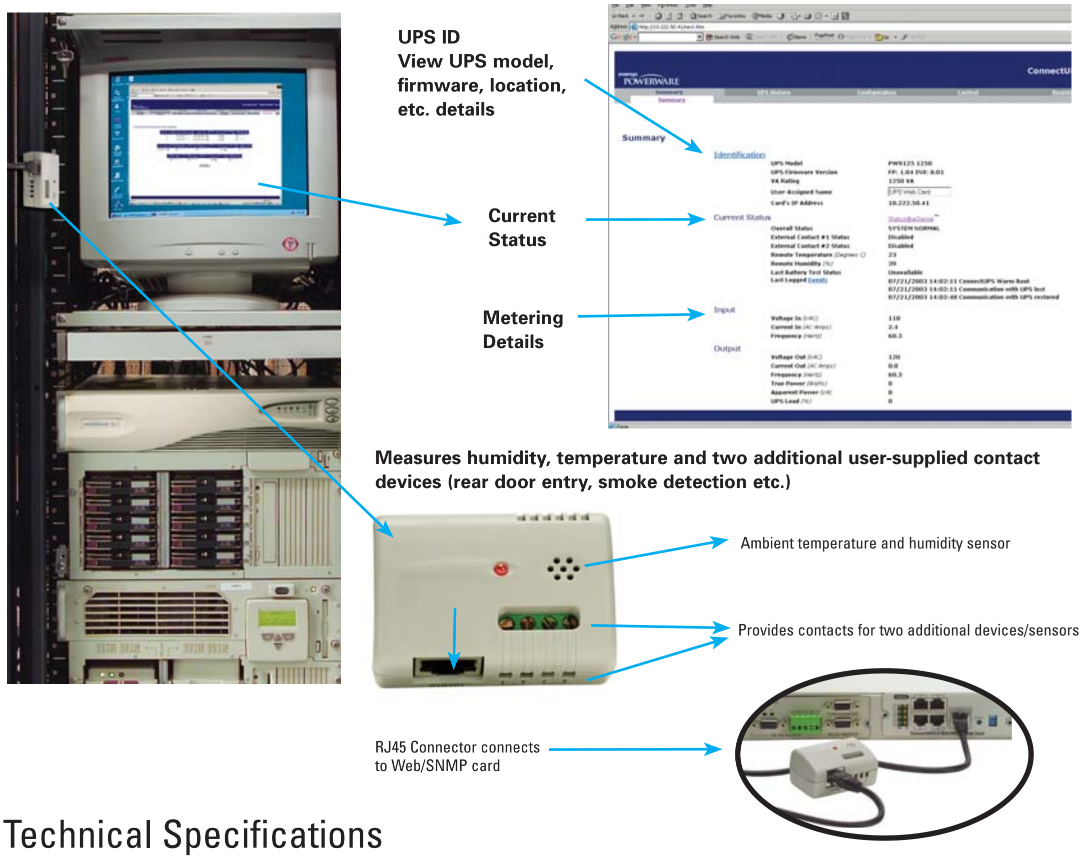
Automated, remote shutdown

Working with NetWatch software, the EMP can direct orderly shutdown of equipment when alarm conditions persist for a specified period, from one to 600 seconds.

The EMP adds an extra layer of protection by monitoring remote environmental conditions, notifying appropriate personnel of problem conditions, and initiating action to shut down systems if necessary to protect them from harm.

EATON
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Hot-pluggable and seamless integration with ConnectUPS Web Cards



Technical Specifications

Model	Environmental Monitoring Probe
Description	UPS accessory providing remote monitoring of temperature, humidity and two contact closure devices in combination with ConnectUPS Web Cards
Part Number	116750224-001
Protocol support	HTTP, SNMP, DHCP, bootp, ARP, RARP, Telnet, SMTP, TFTP, WAP
Compatibility	10/100Mb ConnectUPS-X, ConnectUPS-BD and ConnectUPS-E with FW V3.01 and higher, PowerVision, PowerVision Data Acquisition Terminal (DAT)
Temperature Monitoring	Measures temperatures between -20ºC and 80ºC with an accuracy of ±1ºC
Humidity Monitoring	Measures relative humidity between 10 and 90% RH with an accuracy of ±5%
Power input	Derives 12 Vdc from the Web/SNMP Card
Dimensions (inches) LxWxH (mm)	2.26 x 1.48 x 1.15 57.6 x 37.6 x 29.3
Weight	1.19 oz. (34g)
Regulatory	FCC Class B, UL, cUL, CE

For more information, visit our Web site at www.eaton.com/powerquality, or contact us at 1-800-356-5794.

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Finland: 358.94.52.661
France: 33.1.6012.7400
Germany: 49.0.7841.604.0
Italy: 39.02.66.04.05.40
Norway: 47.23.03.65.50
Portugal: 55.11.3616.8500
Sweden: 46.8.598.940.00
United Kingdom: 44.1753.608.700

ASIA PACIFIC
Australia: 61.2.9693.9366
New Zealand: 64.0.3.343.3314
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HK/Korea/Taiwan: 852.2745.6682
India: 91.11.2649.9414 to 18
Singapore/SEA: 65.6825.1668

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AMERICAN SENSORS™

SMOKE ALARM MANUAL
Ionization Type Models - 120 VAC Hardwire

• **Model** ESA5010 - 120 Volt AC Hardwire Smoke Alarm.
• **Model** ESA5011 - 120 Volt AC Hardwire with Relay

Important information about your smoke alarm

• Install alarms outside of every bedroom area and on every floor of your home. Please refer to Section 3 "Where to Locate Smoke Alarms" for details.
• Test the alarm weekly by pressing and holding the test button for up to 20 seconds until the alarm sounds.
• The models described in this manual are designed for single family residences, including homes and apartments rather than commercial or industrial use.

Smoke Alarm Safety Features

• **Dual-Ionization Chambers** - Advanced design responds to visible or invisible particles of combustion (smoke) to sense fires in their earliest stages. Compensates for changes in humidity and temperature to virtually eliminate "nuisance" alarms caused by normal atmospheric changes in the home.
• **Operating Light (LED)** - A continuous green light located behind the slotted case indicates the smoke alarm is receiving AC power.
• **Interconnection** - Interconnection facilities for up to 11 other units, using only three wires, including AC power. When one alarm sounds, all properly interconnected smoke alarms follow. NOTE: Interconnect only with the models specified in Section 6.
• **Alarm Source Indicator** - The red operating light in the unit originating the alarm will flash rapidly in the event of an alarm. With interconnected units, this feature allows for an easy check to determine the originator.
• **Locking Key** - The auxiliary locking key provided can be used to lock the smoke alarm to the mounting plate. This helps to reduce the risk of unauthorized removal.
• **Sensitivity Test Button** - Test sensitivity, as well as circuitry and horn. With interconnected units, activating test button on one unit will cause all properly interconnected units to sound. An important and convenient check of system integrity.
• **Quick Disconnect Power Connector** - For easy installation, connect the wires separately from the unit and then plug into the back of the unit.
• **Detachable Mounting Plate** - For easily securing the alarm to the junction box.
•

MAXIMUM POWER REQUIREMENTS
OPERATING VOLTAGE 120VAC

Model	Power Supply	Standby	Alarm
ESA5010	120 VAC	20mA	50mA
ESA5011	120 VAC	20mA	70mA

• **Relay Connection**
Model ESA5011 only - The ESA5011 smoke alarm provides one Form C, normally open/normally closed contact which is activated on alarm.
Integral relay - The ESA5011 comes complete with voltage free contacts, allowing the unit to be used with a variety of auxiliary equipment. The contacts remain closed for the whole period of the alarm. Once the alarm ends, the contacts open.

CONTENTS OF THIS MANUAL

1. CAPABILITIES AND LIMITATIONS OF SMOKE ALARMS

ASI Electronics smoke alarms are designed to provide early warning of fire and smoke at reasonable cost. Early warning can mean the difference between a safe escape and no escape at all. While smoke alarms can provide invaluable protection for you and your family, they do have limitations.

• **Smoke alarms cannot work without power.** Battery operated alarms will not work without proper batteries, with dead batteries or if batteries are not properly installed. AC powered alarms will not work if their AC power supply is cut off by an electrical fire, an open fuse, a circuit breaker or any other reason.
If you are concerned about the reliability of either battery or your AC power supply for any of the above reasons, you should install in your home both AC and battery powered smoke alarms for added security. American Sensors also offers the SA379 model which is AC powered with battery back-up.
• **Smoke alarms are incapable of sounding the alarm until smoke reaches the sensing chamber.** Anything preventing smoke from reaching the alarm may delay or prevent an alarm. A smoke alarm cannot detect fire in the walls, chimney or roof unless and until a significant amount of smoke reaches the alarm. A closed door may prevent smoke from reaching an alarm on the other side of the door. A smoke alarm may not sense a fire on another floor of a home. For example, a basement smoke alarm may not detect a fire which started on the first or second floor.
• **Smoke alarms may not be heard.** The loudness of the horn in your alarm meets current standards. However, the sound may be blocked by distance, closed doors, or ambient noise such as traffic or a stereo. Smoke alarms may not be heard by persons who are hard of hearing.
For these reasons, **a smoke alarm should be installed in every room or at least on every level of your home.** American Sensors recommends that hardwire AC Powered smoke alarms be interconnected, so that one alarm will trigger all other alarms to sound their alarms.
• **Smoke alarms are not fool-proof.** Smoke alarms may not always sense every kind of fire. They cannot be expected to sense fires caused by carelessness or by safety hazards. They may not give early warning of fast growing fires caused by smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, natural causes such as lightning, children playing with matches, or arson.
• **Smoke alarms are not substitutes for property, disability, life or other insurance of any kind.** Home owners and renters should continue to insure their lives and property. Consult your insurance agent.
• **Smoke alarms have limited lives.** One or more of the many components could fail at any time. Therefore, test your smoke alarm weekly. Clean and take care of it as described in this manual. Repair or replace the smoke alarm when it fails to test properly. **Your smoke alarm should be replaced if it is ten years old.**
• Ionization Technology vs. Photoelectronic Technology Smoke Alarms

There are two different types of smoke alarm technology currently in general use: Ionization and photoelectronic. While both types of technology are suitable for general residential use, an ionization alarm will normally respond faster to fast flaming fires, while a photoelectronic alarm may be more sensitive to detecting slow smoldering fires. Because home fires develop in different ways and are often unpredictable in their growth, it is impossible to predict which type of alarm will provide the earliest warning. For best home protection install at least one photoelectronic and one ionization smoke alarm on each level of your home. Models ESA5010 and ESA5011 are ionization type smoke alarms.

A photoelectronic smoke alarm senses smoke using an electronic photo receptor to sense the scattering of light by smoke particles.

2. SAFETY TIPS

Properly installed and maintained smoke alarms are an essential part of a good home fire safety program. **Your fire safety program should also include a review of fire hazards and the elimination of dangerous conditions** whenever possible. Consider the following tips:

• Use smoking materials properly. Never smoke in bed.
• Keep matches and cigarette lighters away from children.
• Store flammable materials in proper containers. Never use them near an open flame or sparks.
• Keep electrical appliances in good condition. Do not overload electrical circuits.
• Keep stoves, fireplaces, chimneys, and barbecue grills grease free. Make sure they are properly installed and away from any combustible materials.
• Keep portable heaters and open flames such as candles away from combustible material.
• Do not allow rubbish to accumulate.
• Keep a supply of extra batteries on hand for your battery powered smoke alarms.
• Do not stand too close to the alarm when the unit is in alarm as the loud horn could damage your hearing.

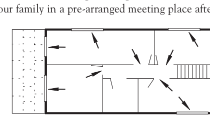
⚠ WARNING Never disconnect the battery or the AC power on any type of smoke alarm to silence a nuisance alarm. Clear the area of smoke by opening doors and windows or fanning the smoke away.

Most important, when fire strikes, a prepared and practiced escape plan can make the difference between life and death. Develop an escape plan and practice it with the entire family, including small children.

• Ensure all family members are familiarized with the alarm signal.
• Prepare an escape plan. Draw a Floor Plan of Your Home and determine two exits from each room. There should be a way to get out of each bedroom without opening the door.
• Have Fire Drills Often. Practice your Escape and BE PREPARED.
• Decide on a meeting place at a safe distance from your home.

IN CASE OF FIRE

• Don't waste time collecting possessions after a fire starts.
• Arouse all occupants and leave the building. Your most valuable possession is your life.
• Doors can mean escape or death. Never open doors without first checking for heat. Test them with your hands, if they feel warm, fire may be walled up behind them - leave closed and find another escape route.
• Call the fire department from OUTSIDE the building.
• If trapped inside, stay close to the floor, cover mouth with cloth, conserve breath as you crawl to safety.
• Keep all doors and windows closed except for escape purposes.
• NEVER re-enter a burning building.
• Keep your family in a pre-arranged meeting place after your escape.



Your local fire department may be able to offer you additional ideas for safety and escape plans in the home.

3a. WHERE TO LOCATE SMOKE ALARMS

As a minimum, smoke alarms should be located between sleeping areas and potential sources of fire such as a kitchen, heated garage or basement. In single storey homes with one sleeping area, an alarm should be installed in the hallway outside the bedrooms (see Figure 1). In single storey homes with two separate sleeping areas, a minimum of two alarms are required, one outside each sleeping area (see Figure 2). In multi-level or split-level homes, as a minimum, an alarm should be installed outside each sleeping area, in the basement and at every level of the home (see Figure 3).

• In every room of your home (except the bathroom): Research indicates that substantial increases in warning time can be obtained with each properly installed, additional alarm.
• In bedrooms: In anticipation of fires originating within these rooms, caused by faulty wiring, lamps, appliances, smoking or other hazards.
• In hallways: At a distance no greater than 13 feet (4 meters) from the farthest wall and no greater than 26 feet (8 meters) from the next alarm.
• In the center of a room or hallway: As it is impossible to predict the source of a fire. If it is necessary to place the alarm on a wall, always locate the top of the smoke alarm 4-6 inches (10-15 cm) from the ceiling.
• As needed: To compensate for closed doors and other obstacles that may interfere with the path of smoke to an alarm. They may also prevent occupants on one side of a closed door from hearing an alarm on the other side of the door.
• Models ESA5010 and ESA5011 - Hardwire models can be located in any area of the home.

READ "CAPABILITIES AND LIMITATIONS OF SMOKE ALARMS" in Section 1 of this manual.
Your local fire department or insurance

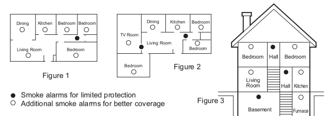


Figure 1 Figure 2 Figure 3

These diagrams show smoke alarm locations as recommended above in 3a.

company may be able to give you further advice on the best smoke alarm locations in your home. Call them and ask.

3b. WHERE TO LOCATE SMOKE ALARMS IN MOBILE HOMES.

NOTE: Power supply must be 120 Volts AC for models ESA5010 and ESA5011.
In mobile homes built after 1978 locate the smoke alarm as described above.
Older mobile homes may have little or no insulation compared to the ones built post 1978. These uninsulated exteriors can disrupt airflow around the smoke alarm in hotter or colder weather. **Locate the alarm only on interior walls** 4" to 6" (10 to 15 cm) from ceiling 1. if you own an older mobile home, or 2. if you notice the exterior walls and/or ceiling are noticeably cold or warm or 3. if you are uncertain about the quality of insulation.
Regardless of the age of the mobile home, locate alarms throughout to ensure maximum protection. Follow the location instructions in this manual.

4. NFPA RECOMMENDATIONS

For your information, the National Fire Protection Association's Standard 72, Section 2-2.1.1.1 & A-2.5.2.1, reads as follows:
2-2.1.1.1 Smoke alarms shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms and on each additional storey of the family living unit, including basements and excluding crawl spaces and unfinished attics. In new construction a smoke alarm also shall be installed in each sleeping room.
A-2.5.2.1 Smoke detection - Are more smoke detectors desirable? The required number of smoke alarms might not provide reliable early warning protection for those areas separated by a door from the areas protected by the required smoke alarms. For this reason, it is recommended that the householder consider the use of additional smoke alarms for those areas for increased protection. The additional areas include the basement, bedrooms, dining room, furnace room, utility room, and hallways not protected by the required smoke alarms. The installation of smoke alarms in kitchens, attics (finished or unfinished), or garages is not normally recommended, as these locations occasionally experience conditions that can result in improper operation.

5. LOCATIONS TO AVOID

Avoid locations where smoke may not reach the alarm in time to provide early warning, or where the alarm may not be effective. DO NOT PLACE SMOKE ALARMS:

• **In turbulent air** from fans, doors, windows, etc. The rapid air movement may prevent combustion particles from entering the alarm.
• **In dead air spaces** such as at the peak of an "A" frame ceiling. "Dead air" at the top may prevent smoke from reaching the alarm in time to provide early warning. In rooms with simple sloped, peaked or gabled ceilings, install smoke alarms on the ceiling 3 feet (90 cm) from the highest point of the ceiling.
Note: For complex ceiling structures, consult a safety expert for the number of alarms required and the best locations.
• **In very hot or cold areas** where the temperature exceeds 100ºF (38ºC) or falls below 40ºF (5ºC).
• Less than 6 inches (15 cm) from the wall when mounted on the ceiling.

⚠ WARNING Nuisance alarms could result when smoke alarms are located where interference may occur with the sensing chamber. **To avoid nuisance alarms, DO NOT place smoke alarms:**

• **In high humidity areas** such as bathrooms and attics. Place smoke alarms at least 10 feet (3 meters) away from bathrooms.
• **In insect-infested areas.**
• **In poorly ventilated kitchens or garages.**
• **In very dusty and dirty areas.**
• **Near fluorescent lights.** Place smoke alarms at least 5 feet (1.5 meters) from fluorescent lights.

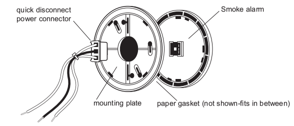
This smoke alarm is suitable for residential use. It is not to be connected to a commercial or industrial fire alarm panel.

6. INSTALLATION AND TESTING

Note: This equipment should be installed in accordance with the National Fire Protection Association Standard 72. (National Fire Protection Association, Batterymarch Park, Quincy, MA 02269).

This model has an optional Locking Key to better secure the alarm to inhibit unauthorized removal. If securing the alarm is a concern, remove and save the "Locking Key" from the back plate with needle nosed pliers before installing the alarm. See point 12 in this section for more details on this feature.

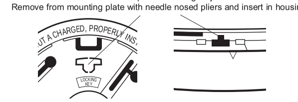
A. Installation
Mount to any standard or rectangular junction box with a minimum depth of 1 inch (2.5 cm).
Model ESA5010- 120 VAC, 60Hz, 50mA operation
Model ESA5011- 120 VAC, 60Hz, 70mA operation
WARNING: Wiring should only be installed by a licensed electrician in accordance with the National Electrical Code and local codes.
WARNING: The circuit used to power the smoke alarm must be a 24 hour voltage circuit that cannot be turned off by a switch or a ground fault interrupter. It is highly recommended that smoke alarms be wired on a separate circuit (one with no other lights or appliances) to ensure maximum reliability of AC power supply. For



installation of smoke alarms in Dwelling Units, it is important to follow the National Electrical Code and local codes.

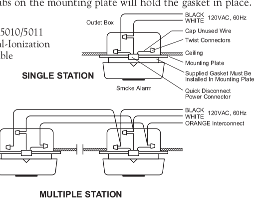
1. Electricity must be turned off at service entrance before beginning installation to prevent electrical shock or equipment damage.
2. Location must comply with applicable building codes.
3. Install a junction box where you plan to install the alarm. Use standard 14 gauge wire.
4. Connect black and white wires color to color from power connector to AC power leads.
5. For multiple station application use the orange wire to interconnect. If unit is not to be interconnected, cap unused wire. NOTE: The ESA5010 and ESA5011 are interconnectable with up to 11 other units.
6. Loosen or remove screws from junction box.
7. Attach flat side of mounting plate and tighten screws to fit snugly against the junction box and ceiling or wall.
8. Bring power connector through center opening.

To Use Optional Locking Key-
Remove from mounting plate with needle nosed pliers and insert in housing



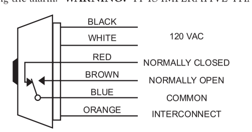
9. Slip the paper gasket supplied with the alarm over the power connector and then onto the mounting plate so that the four plastic tabs on the mounting plate will hold the gasket in place.

MODEL ESA5010/5011
120 VAC Dual-Ionization
Interconnectable
Smoke Alarm



RELAY CONNECTION- Model ESA5011 only

The gasket will prevent downward air currents from entering the smoke alarm through holes in the back of the alarm unless blocked off downward air currents could prevent smoke from entering the alarm. **WARNING:** IT IS IMPERATIVE THAT



YOU INSERT THE GASKET WHEN INSTALLING YOUR SMOKE ALARM.

10. Align the plug area on the smoke alarm with the cut-out in the gasket and place the smoke alarm on the mounting plate, turn clockwise to fasten it to the mounting plate.
11. Plug wire connector into the back of the alarm.
12. If auxiliary lock is desired, insert the Locking Key into the slot in the base of the alarm. Locking Key should "click" into position and be flush with the alarm housing. CAUTION: Do not attempt to remove alarm without first removing the Locking Key. If the key is not first removed, damage may result. To remove use a screwdriver and gently pry the Locking Key loose.
13. Test alarm operation after installation in accordance with "Operation: How to Test" instructions.

Model ESA5011 provides one form C (NO/NC) contact which activates on alarm. Contact rating (resistive): 10 A at 120 VAC/ 10A at 28 VDC.
Relay wires (red/brown/blue) 14 gauge stranded copper.
Install in accordance with National Electrical code and local building codes.
Note: Maximum interconnect wiring length is 150 feet (50 meters).
IMPORTANT: The ESA5010/5011 is not interconnectable with any other model produced by another manufacturer.
The ESA5010/5011 may be interconnected only with the following Underwriters Laboratories Inc. Listed smoke alarm models:

American Sensors	SA379
American Sensors	SA360
ASI Electronics	ESA5010
ASI Electronics	ESA5011
Dicon Safety Products Inc.	670L
Dicon Safety Products Inc.	670LR
Dicon Safety Products Inc.	370LBX

B. Operation: How To Test
Testing After Installation

1. Smoke Test - Hold a piece of cotton string with pliers. Leave about 2 inches (5 cm)of string dangling from the pliers. Burn the tip of the string with a safety match, extinguish flame and hold smoking string 6 inches (15 cm) below and to one side of the smoke alarm. Blow smoke towards the smoke alarm until the horn sounds. The horn will sound until the sensing chamber is clear of smoke. Repeat this monthly.
2. Check to see that the green "POWER ON" light is on. The "POWER ON" light is visible behind the slotted case and confirms that the smoke alarm is receiving AC power.
3. Press and hold the test button until the alarm sounds. NOTE: It may be necessary to press the test button for up to 20 seconds for an alarm to sound. An alarm is indicated by 3 loud beeps repeating every 5 seconds. Alarm may continue to sound for up to 10 seconds after button is released. (NOTE: Model ESA5011: Pressing the test button activates the relay.)
4. At least once a week, press the test button and hold until the alarm sounds, then release.
NOTE: Multiple Station Only:
5. Test each alarm separately in the system.
6. Determine that the initiating alarm triggers other alarms in the system.
7. Model ESA5011: Pressing the test button activates the relay.

⚠ WARNING **Test smoke alarm operation after vehicle has been in storage, before each trip, and at least once per week during use.**

7. MAINTENANCE & TROUBLESHOOTING

TEST THE ALARM WEEKLY. VACUUM EVERY SIX MONTHS.
Your smoke alarm should be cleaned every six months to help keep the unit working efficiently. REMOVE POWER TO ALARM. Gently vacuum through the vents of the alarm with a soft brush attachment. Keep vacuum nozzle from touching the unit.
RE-ESTABLISH POWER TO ALARM.
Problems may be indicated by the following:
1. The alarm does not sound upon pressing the test button.
2. The alarm does not sound with the smoke test.
3. The green operating light does not remain steadily on when unit is AC powered.
4. The red operating light remains steadily on or off. (i.e. does not flash once every 45 seconds, when the unit is not in alarm).

TRY THE FOLLOWING:
1. Inspect breaker or fuse in power circuit to alarm.
2. Gently vacuum as recommended above.
3. Call an electrician to inspect house wiring and connection to alarms.

If these procedures do not correct the problem, do NOT attempt repairs. If the smoke alarm is within warranty period and terms, indicate the nature of the problem and return the unit with proof of purchase to the **point of purchase,** distributor or manufacturer. See below for instructions. Units beyond warranty cannot be economically repaired.

FALSE ALARMS:
Abnormal air conditions may cause the highly sensitive smoke alarm to give a "false" alarm. If no fire is apparent, ventilate the room and/or blow fresh air into the unit until the alarm stops. Once cleared, the smoke alarm will automatically reset.
DO NOT DISCONNECT THE AC POWER SUPPLY.
Dust can lead to excess sensitivity. Vacuum as recommended above.

8. LIMITED WARRANTY

Your American Sensors smoke alarm is warranted for ten years from the date of purchase against defect in material and workmanship. Units returned to Dicon Global Inc. with proof of purchase during this period as a result of such defects will be repaired, or replaced at Dicon Global Inc.'s option. This warranty only covers defects in material or workmanship in normal residential use. This warranty does not cover damage resulting from negligent handling, misuse, or lack of reasonable care. This warranty is in lieu of any other warranty either expressed or implied.
dICON gLOBAL INC. SHALL HAVE NO LIABILITY FOR ANY PERSONAL INJURY OR PROPERTY DAMAGE, OR ANY SPECIAL INCIDENTAL, CONTINGENT OR CONSEQUENTIAL DAMAGE OF ANY KIND RESULTING FROM A FIRE. THE EXCLUSIVE REMEDY FOR BREACH OF THE LIMITED WARRANTY CONTAINED HEREIN IS THE REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT AT DICON GLOBAL INC.'S OPTION. IN NO CASE SHALL DICON GLOBAL INC.'S LIABILITY UNDER ANY OTHER REMEDY PRESCRIBED BY LAW EXCEED THE PURCHASE PRICE. YOUR SMOKE ALARM IS NOT A SUBSTITUTE FOR PROPERTY, DISABILITY, LIFE OR OTHER INSURANCE OF ANY KIND. APPROPRIATE COVERAGE IS YOUR RESPONSIBILITY. CONSULT YOUR INSURANCE AGENT.
This warranty gives you specific legal rights and you may have other rights which may vary from state to state.

Units may be returned to point of purchase according to retailers exchange / return policy. Or call 1-800-387-4219, for shipping instructions and a returned goods authorization number "RGA" number, to return to Dicon Global Inc. Returned goods must be shipped prepaid. A cheque for $5.00 is also required for return postage. Please mark the "RGA" number on the exterior of your package. Date code located on back of smoke alarm.

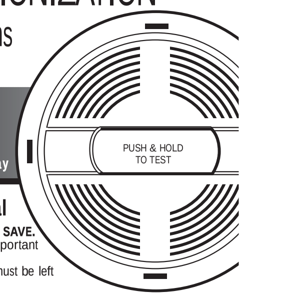
Dicon Global Inc.
20 Steelcase Road West, Unit 3
Markham, Ontario,
Canada L3R 1B2
email: info@diconglobal.com

AMERICAN SENSORS™

120 VAC-IONIZATION
Smoke Alarms

MODELS

•ESA5010-
120 VAC
•ESA5011-
120 VAC with Relay



Owner's Manual

READ CAREFULLY AND SAVE.
This manual contains important information.
A copy of this manual must be left with the end user.

2502-2527

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UPS REMOTE
MONITOR PANEL

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10.3 Optional Remote Monitor Panel

As an option, a Remote Monitor Panel (RMP) can be installed to monitor the operation of the UPS system from virtually any location within the facility, up to 152.4m (500 ft) from the UPS. The RMP contains backlit status indicators and a local horn. The RMP can be flush-mounted or surface-mounted on a desktop, or secured to a wall. Figure 10-1 shows an RMP.

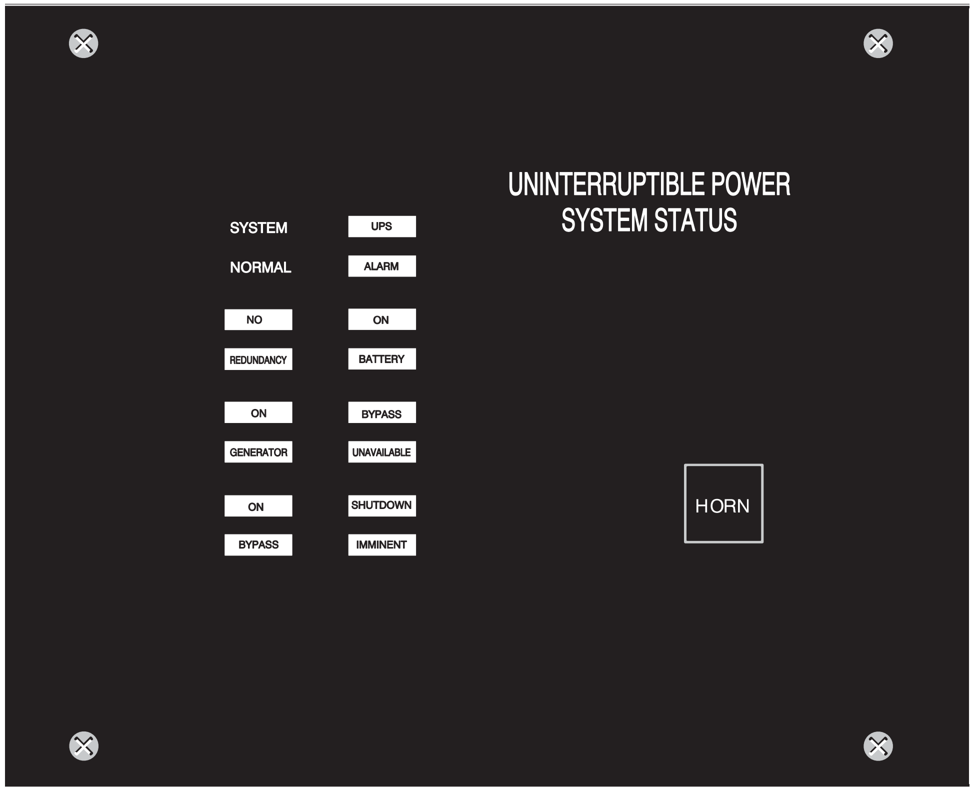
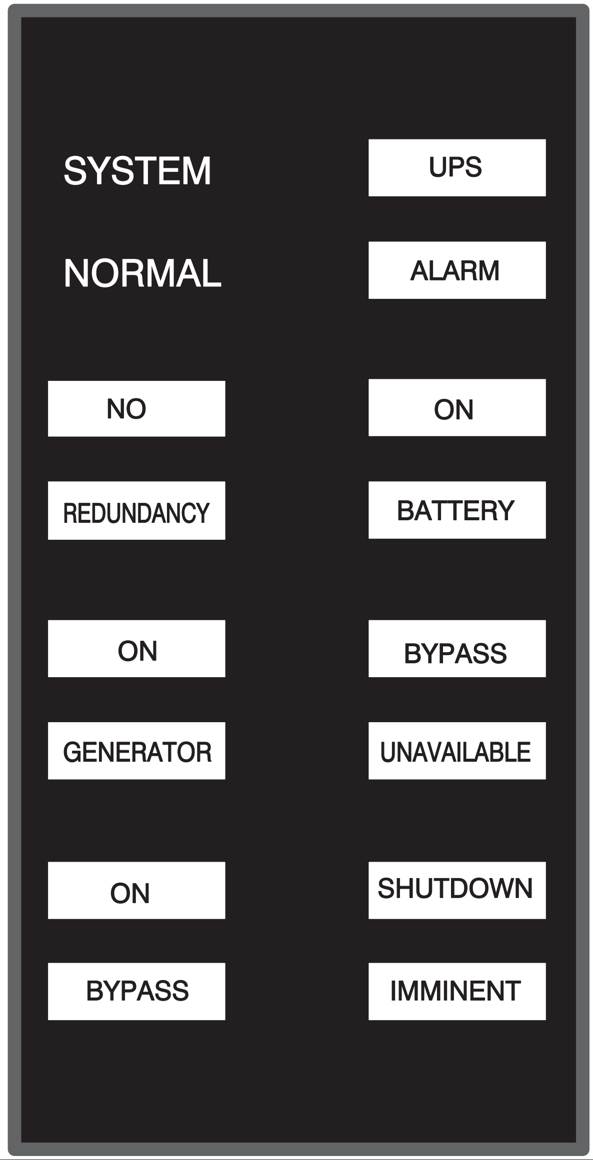


Figure 10-1. Remote Monitor Panel

The RMP contains a local horn and the backlit status indicators listed in Table 10-1.

Table 10-1. RMP Status Indicators

Indicator	Description
SYSTEM NORMAL	The UPS is energized (either with utility power or battery backup) and is supplying conditioned power to the critical load.
NO REDUNDANCY	This indicator applies only to parallel systems when one cabinet is not functioning.
ON GENERATOR	The UPS input and bypass are being supplied by the power from the generator instead of from the utility power.
ON BYPASS	The bypass source is supplying the critical load. Usually this means that the UPS is not energized. The load is not protected in Bypass mode, and a horn sounds after 30 seconds.
UPS ALARM	The UPS system is issuing an alarm. Conditions that affect the current UPS mode are indicated by the indicators and horn on the UPS.
ON BATTERY	The UPS battery backup is supplying the critical load. The utility power is either interrupted or out of specification. The SYSTEM NORMAL indicator is also illuminated.
BYPASS UNAVAILABLE	The UPS system is in Normal mode, but a bypass source is not within specification. A horn sounds after 30 seconds.
SHUTDOWN IMMINENT	The UPS is preparing to shut down because the UPS is in Battery mode and the DC voltage is approaching its low limit. This indicator is accompanied by a horn.



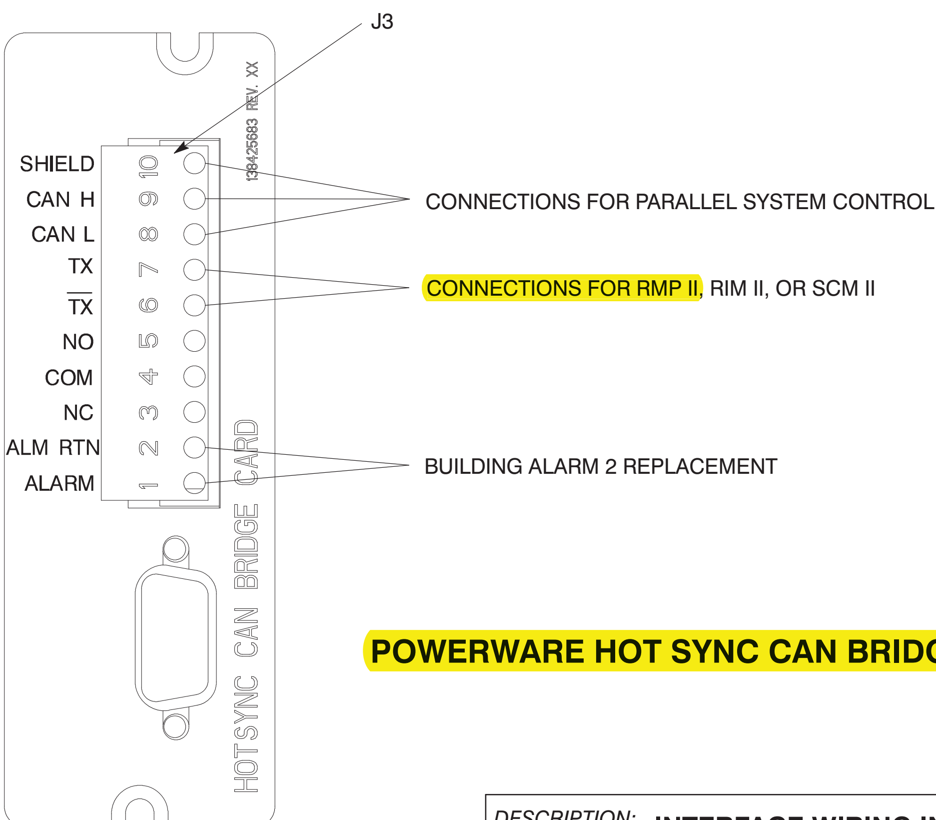
16. Conduit must be installed between the UPM cabinets for parallel interface wiring. Install the interface wiring in separate conduit from the power wiring.

17. Use Class 1 wiring methods (as defined by the NEC) for parallel interface wiring. The wire should be shielded twisted pair, rated for 5 amps maximum.

18. See Table X and Chapter 6 for Powerware Hot Sync CAN Bridge Card interface wiring.

Table X. Powerware Hot Sync CAN Bridge Card Interface Connections

Terminal J3	*Name*	*Description*
1	Alarm	Programmable UPS alarm. Activated by a remote dry contact closure.
2	Alarm Rtn	
3	Not Used	Not Used
4	Not Used	Not Used
5	Not Used	Not Used
6	TX	Remote Monitor Panel II (RMP II), Relay Interface Module II (RIM II), or Supervisory Contact Module II (SCM II) connections.
7	$\overline{TX}$	
8	CAN L	Computer Area Network (CAN) Input for parallel operation.
9	CAN H	
10	Shield	



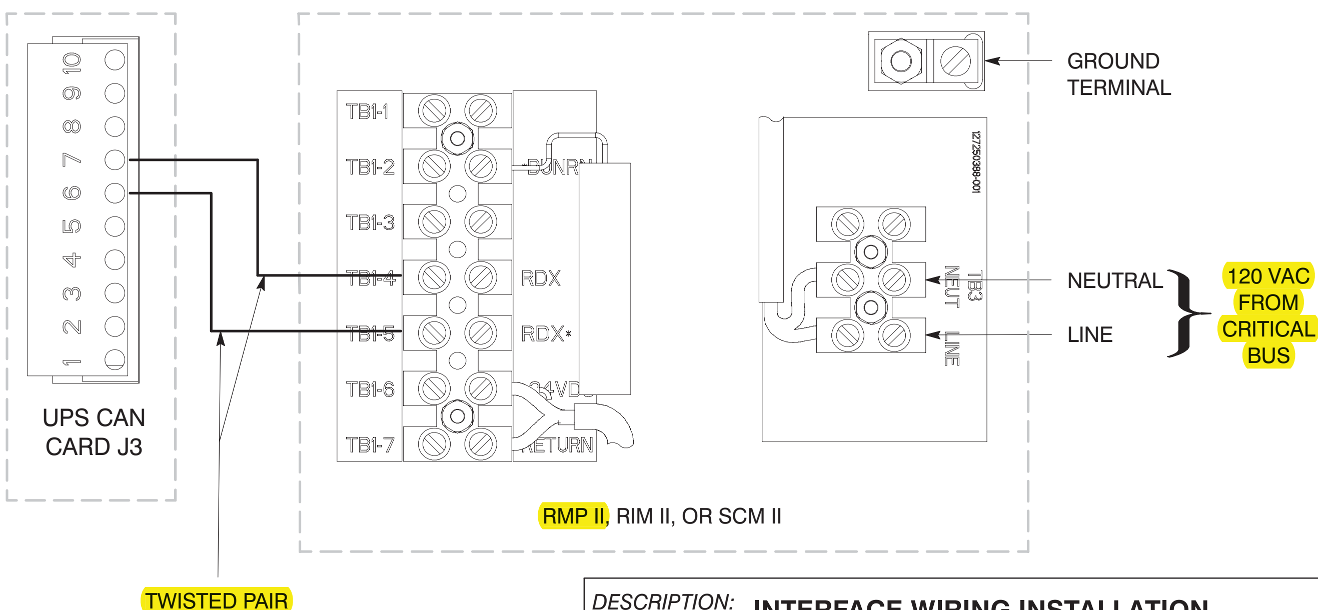
POWERWARE HOT SYNC CAN BRIDGE CARD

NOTE: *All interface wiring is to be provided by the customer.*

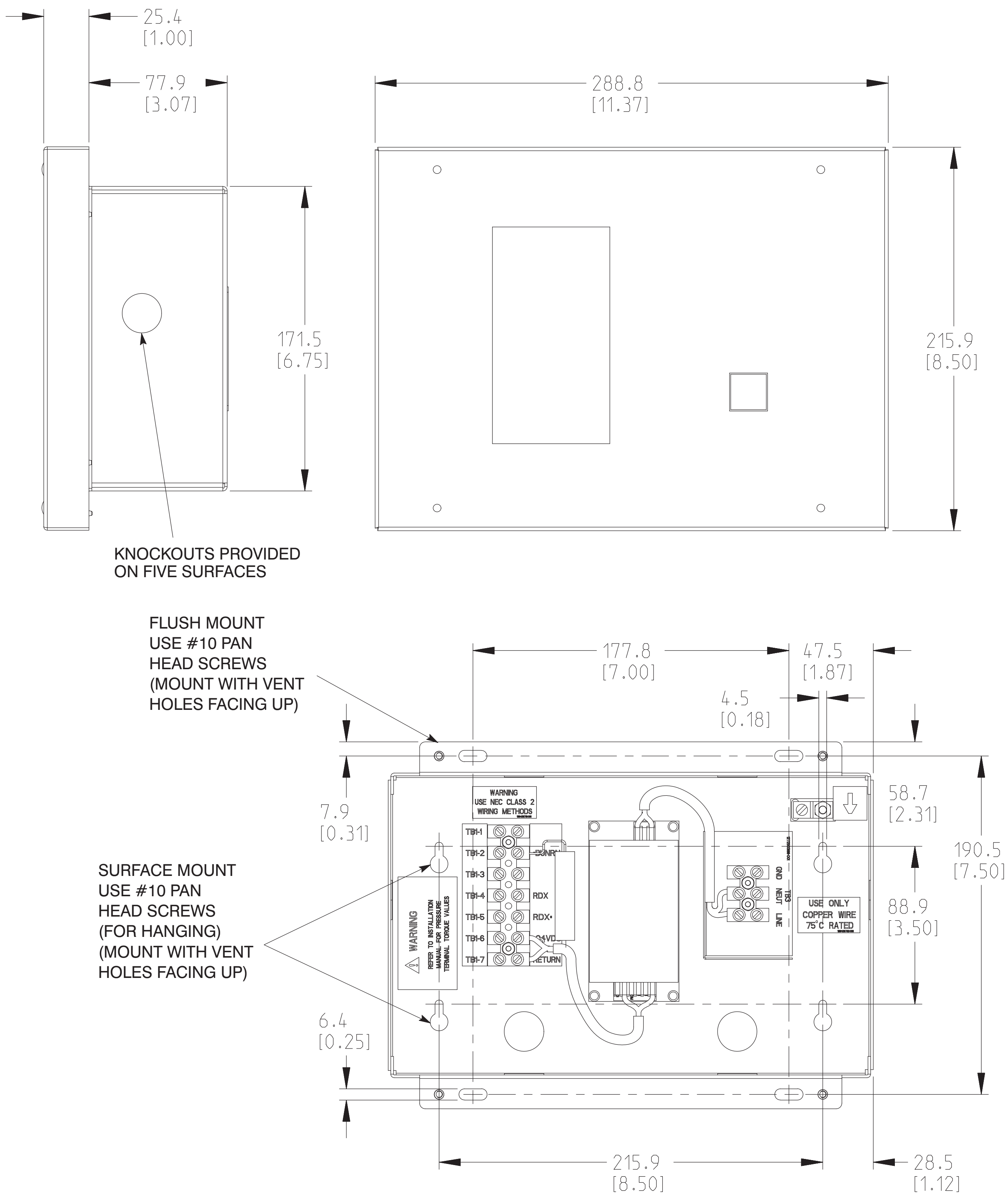
DESCRIPTION:	**INTERFACE WIRING INSTALLATION NOTES AND TERMINAL LOCATIONS**		
DRAWING NO:	164201554–8	*SHEET:*	9 of 13
REVISION:	D	*DATE:*	081505

19. Conduit must be installed between the UPS cabinet and the RMP II, RIM II, or SCM II for signal wiring. Conduit must be installed between the device and the power source for power wiring. Install the signal wiring in separate conduit from the power wiring.
20. Conduit and wiring between the UPS and the RMP II, RIM II, or SCM II is to be supplied by the customer.
21. Maximum distance between the UPS cabinet and RMP II, RIM II, or SCM II is not to exceed 500 feet.
22. Use Class 1 wiring methods (as defined by the NEC) for RMP II, RIM II, or SCM II power and signal wiring. Power wiring should be a minimum of 22 AWG and a maximum of 14 AWG. The wire should be rated for 1A minimum.
23. RMP II, RIM II, or SCM II signal wiring should be a minimum of 22 AWG and a maximum of 14 AWG. The wire should be twisted pair, rated for 5A maximum.
24. Use only 75°C copper wire.
25. 120 Vac for the RMP II, RIM II, or SCM II should be provided from the critical bus by facility planners or the customer.
26. See Table X and Chapter 6 for CAN Bridge Card and RMP II, RIM II, or SCM II installation.

RMP, RIM, or SCM Wiring Terminations			
From UPS CAN Card	*To RMP, RIM, or SCM*	*Tightening Torque Nm (lb in)*	*Remarks*
J3–6 ($\overline{\text{TX}}$)	TB1–5 (RDX*)	0.9 (8)	Use Twisted Pair
J3–7 (TX)	TB1–4 (RDX)	0.9 (8)	
N/A	TB3 Line	0.9 (8)	
N/A	TB3 Neutral	0.9 (8)	
N/A	Ground Terminal	2.7 (24) Maximum	



DESCRIPTION:	**INTERFACE WIRING INSTALLATION NOTES AND TERMINAL LOCATIONS**		
DRAWING NO:	164201554–8	*SHEET:*	13 of 13
REVISION:	C	*DATE:*	081505



Dimensions are in millimeters [inches]

DESCRIPTION: OPTIONAL REMOTE MONITOR PANEL (RMP)	
DRAWING NO: 164201604–11	SHEET: 1 of 1
REVISION: A	DATE: 091505

1.10 9395 Foundation Plan and Mounting Requirements

Proper mounting of the equipment is the single most important factor in withstanding a seismic event. The foundation must be level and continuous under the entire assembly. The foundation must be designed to withstand the reaction loads imposed on it by the equipment during a seismic event. At a minimum, the foundation must be designed to accommodate the tensile strength of the hardware indicated in Table G. The anchoring system should be put in place prior to equipment installation to reduce effort associated with anchoring. Welding to embedded steel members is acceptable provided the strength of the welds is comparable to the mounting bolts.

CAUTION

The user is responsible for compliance with all local seismic codes.

NOTE *Anchoring hardware is not provided with Eaton seismic mounting kits because the type of hardware is dependant on the foundation construction and composition.*

Table G. 9395 Unit and Fastener Requirements for Unit to Floor

Type	Bolt Type and Size	Torque	Quantity
275 kVA UPS	Class 8.8, M12	83 Nm	6
275 kVA UPS and FI-UPM	Class 8.8, M12	83 Nm	12
550 kVA UPS	Class 8.8, M12	83 Nm	8
550 kVA UPS and FI-UPM	Class 8.8, M12	83 Nm	14
825 kVA UPS	Class 8.8, M12	83 Nm	16
825 kVA UPS (2X-UPM)	Class 8.8, M12	83 Nm	14
825 kVA UPS (2X-UPM and FI-UPM)	Class 8.8, M12	83 Nm	20
1100 kVA or 825 kVA and FI-UPM	Class 8.8, M12	83 Nm	22
225-550 kVA MBM	Class 8.8, M12	83 Nm	6
MBM and 275 kVA UPS	Class 8.8, M12	83 Nm	12
MBM and 550 kVA UPS	Class 8.8, M12	83 Nm	14

1.11 Displacement

The horizontal displacement of the top of the equipment is listed in Table H. The horizontal displacements given in Table H are plus/minus values. The equipment must be at the minimum distance listed in Table H to avoid contact with other stationary objects during a seismic event.

Table H. 9395 Unit Seismic Displacement Requirements

Type	Front to Back	Side to Side
275 kVA UPS	74 mm	49 mm
275 kVA UPS and FI-UPM	74 mm	49 mm
550 kVA UPS	39 mm	44 mm
550 kVA UPS and FI-UPM	39 mm	49 mm
825 kVA UPS	44 mm	44 mm
825 kVA UPS (2X-UPM)	74 mm	49 mm
825 kVA UPS (2X-UPM and FI-UPM)	74 mm	49 mm
1100 kVA or 825 kVA and FI-UPM	44 mm	49 mm
225-550 kVA MBM	36 mm	36 mm
MBM and 275 kVA UPS	74 mm	49 mm
MBM and 550 kVA UPS	39 mm	44 mm

Consideration must be given to attachments (conduits, bus duct, etc.) made to the top of the equipment. Attachments must have provisions to accommodate the displacement of the equipment indicated in Table H. Entry from the bottom of the equipment eliminates the need for accommodating this motion for attachments.

1.12 Center of Gravity

For seismic calculations, the center of gravity can be approximated using the dimensions in Table I with respect to the left side bracket's front mounting hole (x,y,z origin).

Table I. 9395 Unit Center of Gravity Specifications

Type	X (left to right)	Y (front to rear)	Z (bottom to top)
275 kVA UPS	856 mm	452 mm	956 mm
275 kVA UPS and FI-UPM	1063 mm	461 mm	943 mm
550 kVA UPS	1140 mm	475 mm	929 mm
550 kVA UPS and FI-UPM	1406 mm	475 mm	928 mm
825 kVA UPS	2160 mm	460 mm	870 mm
825 kVA UPS (2X-UPM)	1823 mm	455 mm	868 mm
825 kVA UPS (2X-UPM and FI-UPM)	2011 mm	460 mm	882 mm
1100 kVA or 825 kVA and FI-UPM	2388 mm	462 mm	880 mm
225-550 kVA MBM	431 mm	323 mm	966 mm
MBM and 275 kVA UPS	1409 mm	412 mm	959 mm
MBM and 550 kVA UPS	1768 mm	442 mm	937 mm

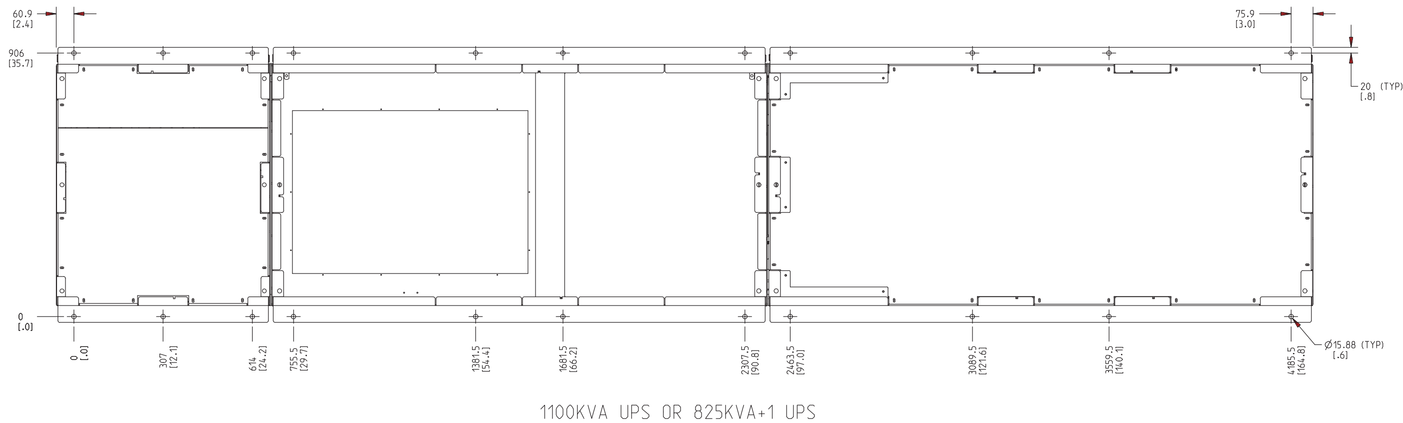


Figure 1-17. 9395 1100 kVA UPS or 825 kVA +1 UPS Seismic Mounting Dimensions

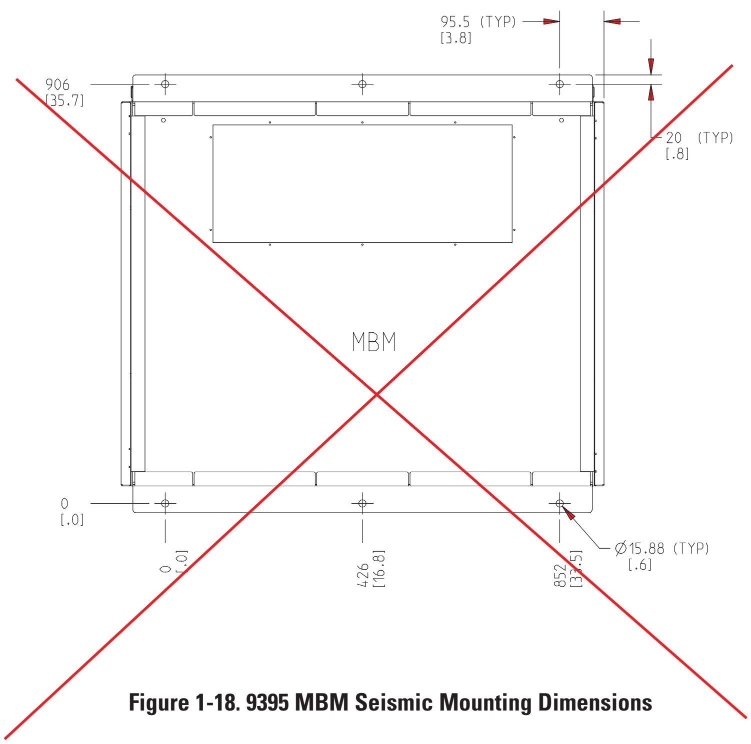


Figure 1-18. 9395 MBM Seismic Mounting Dimensions

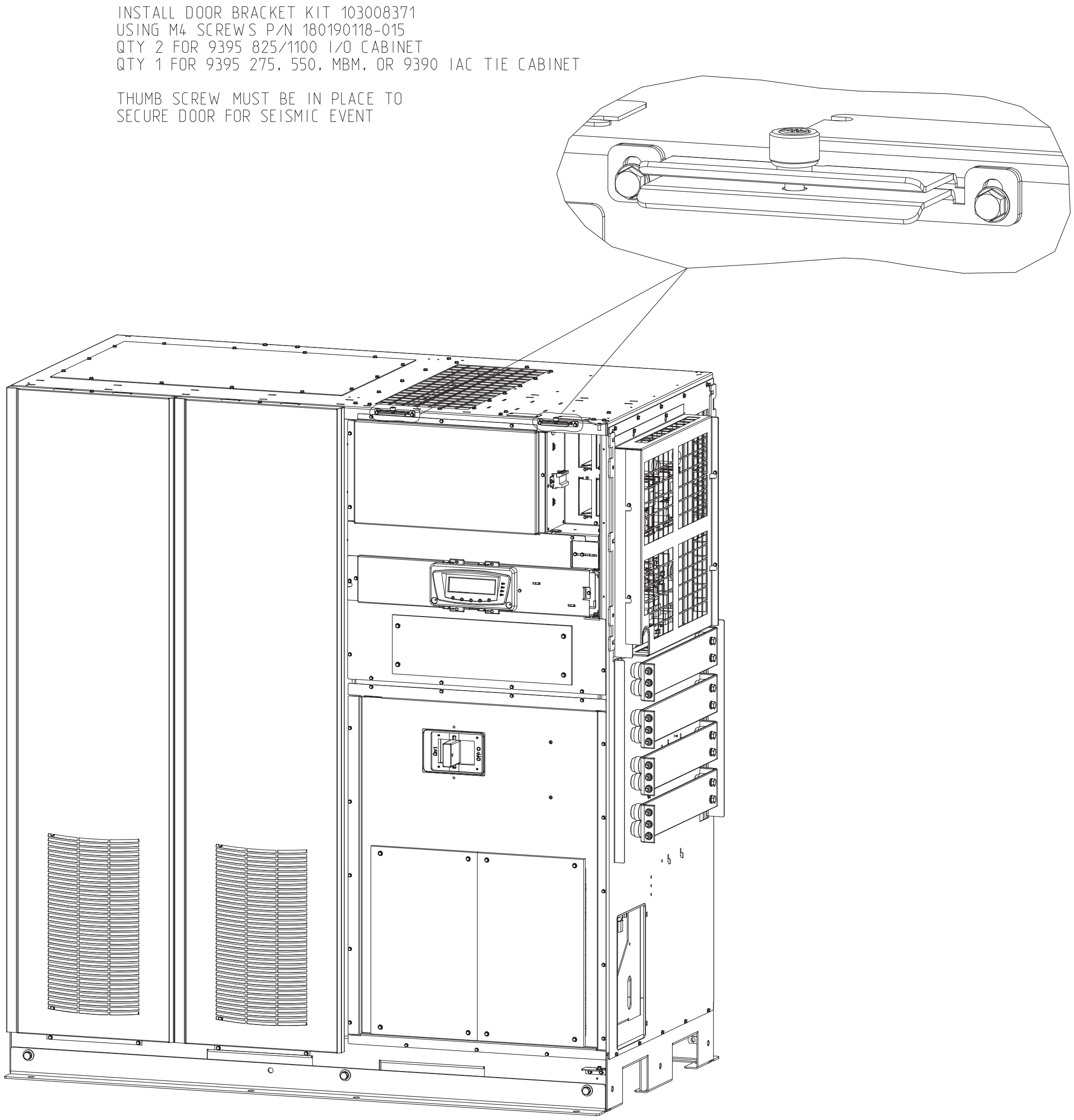


Figure 1-21. 9395 Seismic Door Securing Hardware Detail

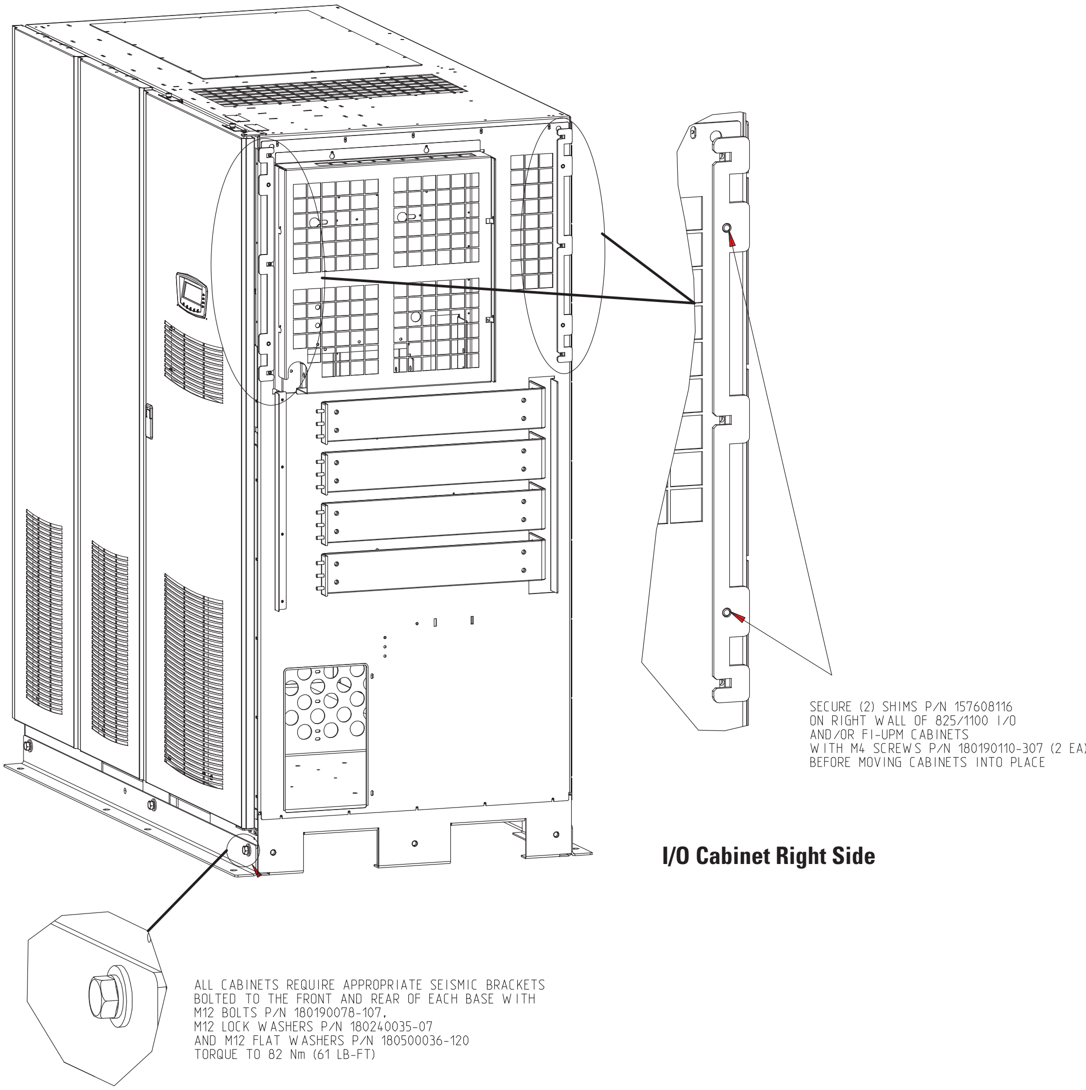


Figure 1-22. 9395 I/O Intercabinet Shim Location and Seismic Floor Bracket Attachment Detail

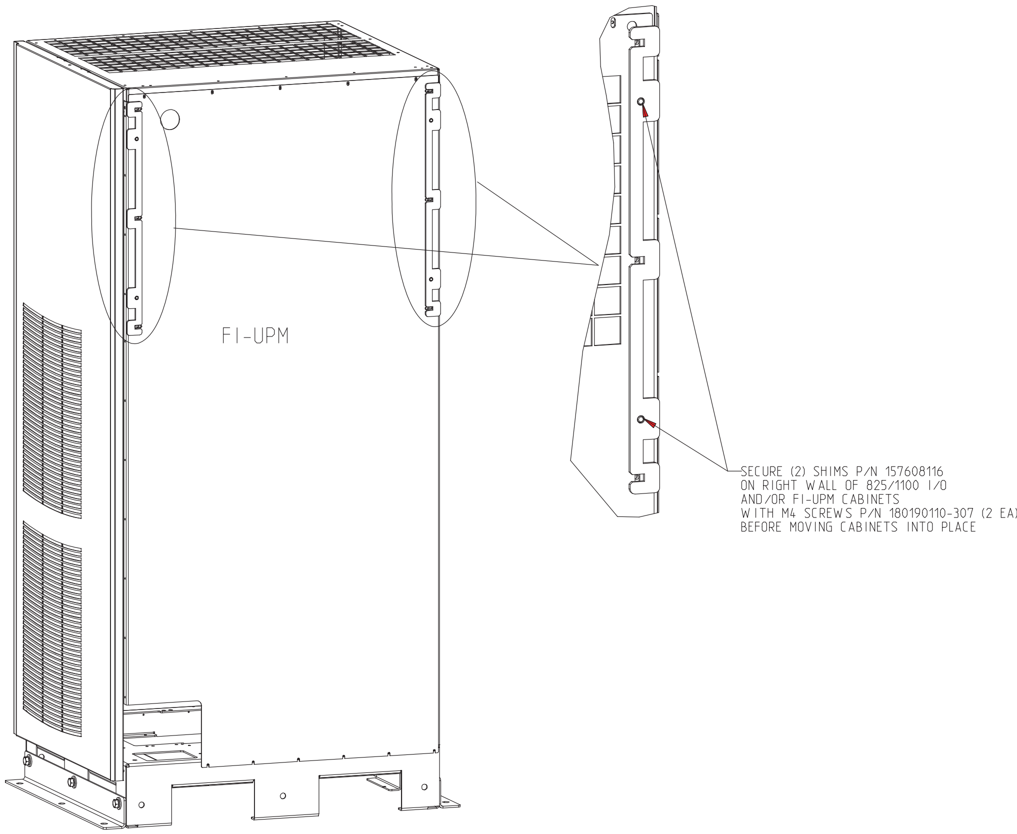


Figure 1-23. 9395 FI-UPM Shim Location Detail for Seismic Kit

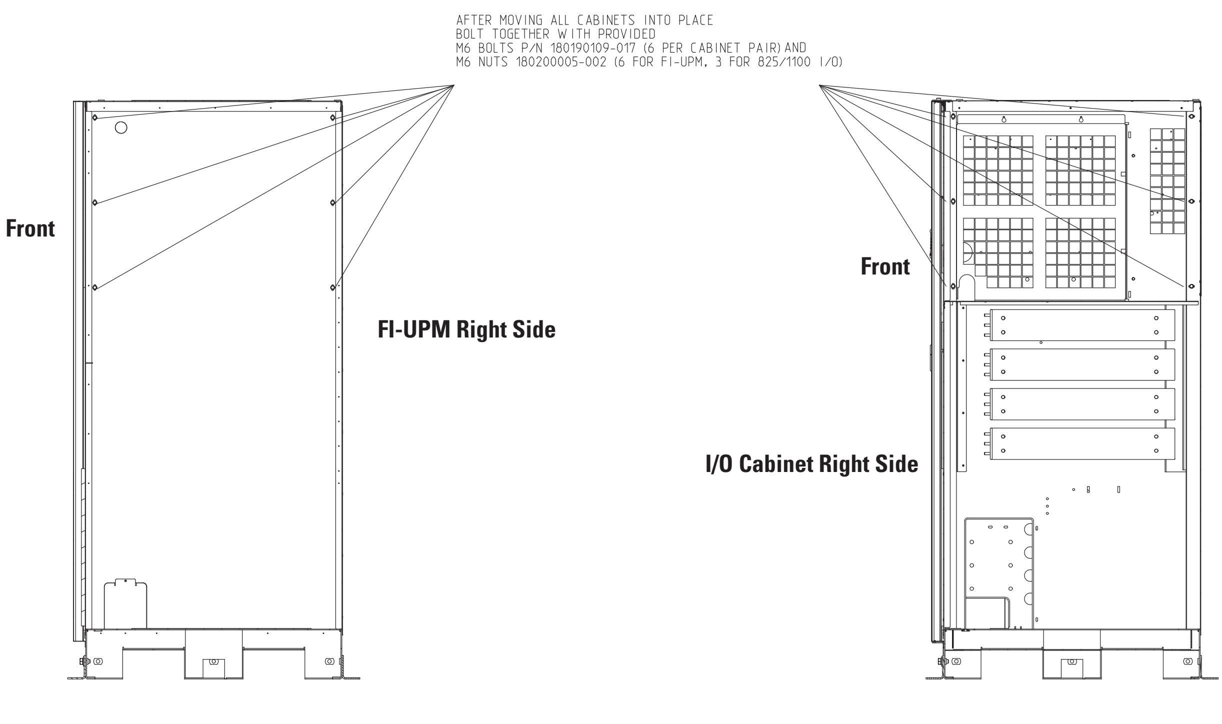


Figure 1-24. 9395 Attachment Detail for FI-UPM and I/O Module

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SPARES

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9395-275kVA UPM 400/480VAC Spares Kit Level "D"
Kit 106711270

PART NUMBER	DESCRIPTION	U/M	QTY
128304134-008	FUSE, 3.00A, 600VAC	EA	3
128307025-004	FUSE 450A 700VAC M8 45MM SQ	EA	8
128307027-001	FUSE, SEMICOND, 700A 700V	EA	2
151101091-001	FAN, 172X150X51 MM, 415 CFM	EA	4

9395-825kVA ISBM 480VAC Spares Kit Level "D"
Kit 106711285

PART NUMBER	DESCRIPTION	U/M	QTY
101073677-002	9395 ISBM MCU Power Supply	EA	1
1028553	Thyristor Module 800A 1600V	EA	4
101073914	9395 Mini CSB Board	EA	1
129400075	Thermal Interface Pad	EA	10
3989190	Silicone Thermal Compound	EA	1
P-151000014	Fan, 172x150x51mm, 403cfm, 48V	EA	1
128307029-002	Fuse, 2000A	EA	6
128304134-008	Fuse, 3A	EA	6
1030951	9395 PCBAS Control Board II	EA	1

MBP

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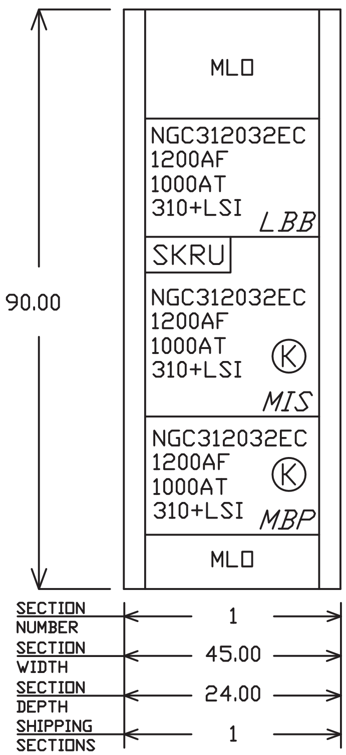
PRLC SWITCHBOARD (FLOOR MOUNT)
SERVICE VOLTAGE 480Y/277V 3 PHASE 4 WIRE
DENSITY RATED 1200A CU MAIN BUS, 2400A NEUTRAL
--> NON SERVICE ENTRANCE
SWITCHBOARD CONSTRUCTION MEETS UL-891
NEMA-1 ENCLOSURE FINISH ANSI-61
ESTIMATED WEIGHT 1200 LBS
4-350MCM GROUND LUGS SUPPLIED AS STANDARD

LEGEND

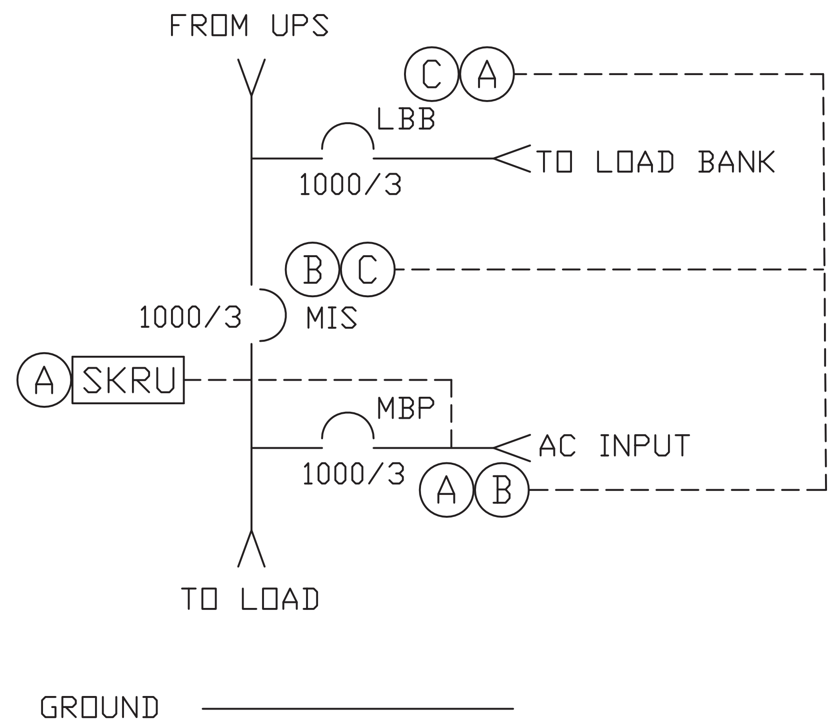
- V - TERMINAL(S)
- (K) - KEY INTERLOCK
- SKRU - SOLENOID KEY RELEASE UNIT

TERMINAL WIRE RANGES	
'FROM UPS' & 'TO LOAD' TERMINALS	(4) 4/0 - 500 MCM
BREAKER TERMINALS 1000A - 3P	(4) 4/0 - 500 MCM
GROUND LUG TERMINALS	#6 - 350 MCM

FRONT VIEW



ELECTRICAL ONE LINE DIAGRAM



REVISION	1

ORIGINAL BY: RWW	DATE: 03/25/14	EATON	RALEIGH SATELLITE
APPROVED BY: RWW	DATE: 03/25/14	TITLE	MAINTENANCE BYPASS SWITCHBOARD
CUSTOMER ID:	SHOP ORDER:	TYPE	PRL C
		SIZE A / FSCM NO / SHEET 1 / REV 1 / G.O. / IT.	ACAD DWG NO ISE-0214-0272-TS03

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BATTERY

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data safe®

The World's First 16V Front Terminal UPS Battery

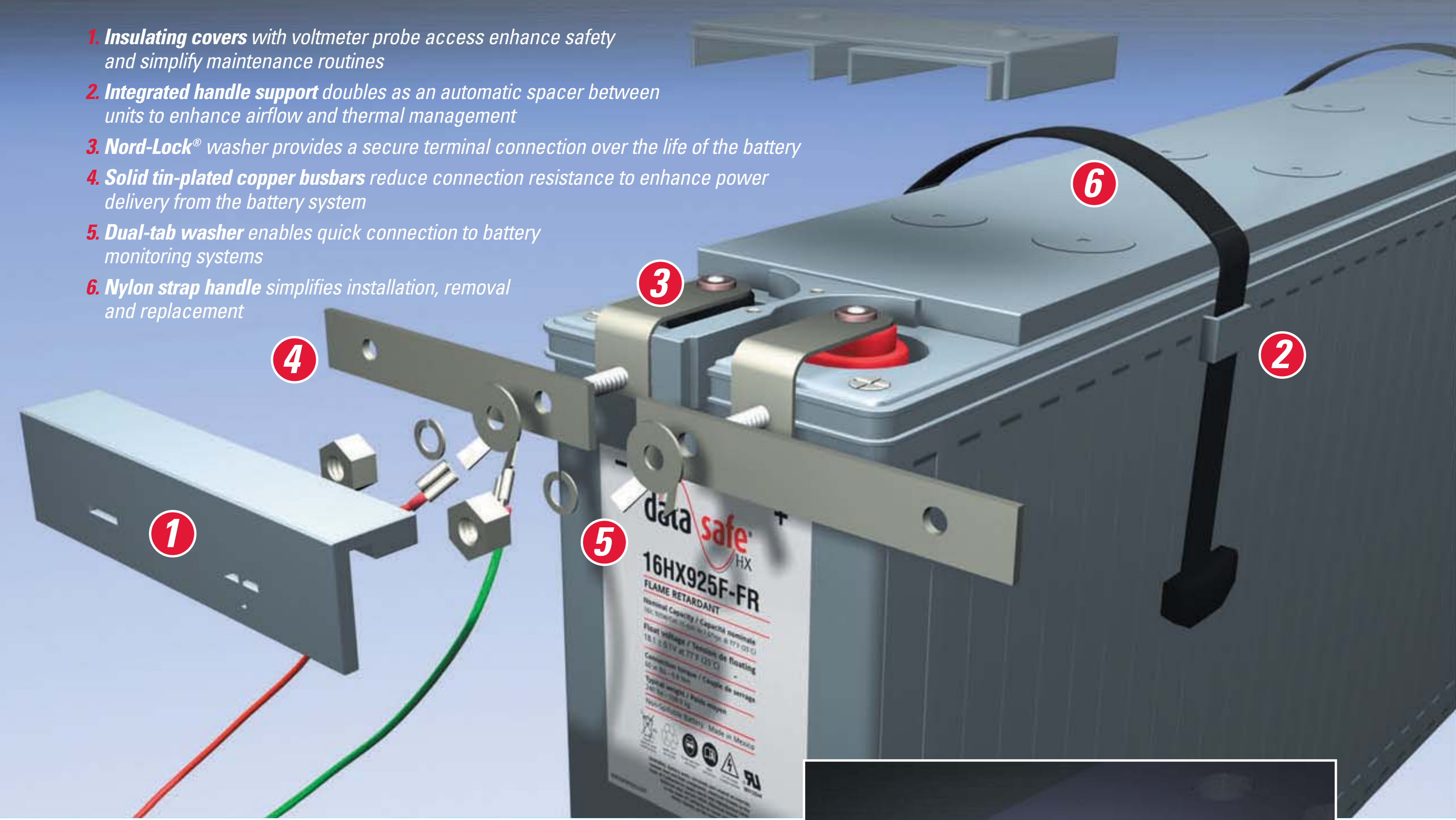


EnerSys®
Power/Full Solutions

Available exclusively from EnerSys®, the world leader in stored power solutions.

OUT IN FRONT OF THE COMPETITION.

1. ***Insulating covers*** *with voltmeter probe access enhance safety and simplify maintenance routines*
2. ***Integrated handle support*** *doubles as an automatic spacer between units to enhance airflow and thermal management*
3. ***Nord-Lock***® *washer provides a secure terminal connection over the life of the battery*
4. ***Solid tin-plated copper busbars*** *reduce connection resistance to enhance power delivery from the battery system*
5. ***Dual-tab washer*** *enables quick connection to battery monitoring systems*
6. ***Nylon strap handle*** *simplifies installation, removal and replacement*



DataSafe® batteries. More power, less space, easier maintenance.

Eliminate the difficult maintenance and burdensome space requirements of top-terminated 12V UPS batteries. Revolutionary, new front-terminated DataSafe 16V UPS batteries, available in 550 WPC, 800 WPC and 925 WPC sizes, are more space efficient, more cost effective, and easier to maintain than 12V batteries. They use proven VRLA technology, are conducive to incorporating monitoring systems, and scale easily to larger capacity UPS systems with one-third fewer parallel battery strings.

Other benefits of DataSafe 16V batteries:

- Smaller footprint per kilowatt
- Simplifies installation
- Improves reliability
- Complete front access
- Eliminates wasted headspace found in typical 12V top-terminated designs
- Easy terminal access simplifies maintenance
- No costly slide out trays required to obtain terminal access



DataSafe® 16V Front Terminal UPS Batteries eliminate the difficult maintenance and burdensome space requirements of top-terminated 12V UPS batteries.

Go to www.savebatteryspace.com and witness the revolution in UPS batteries.

DESIGNED TO BETTER MEET UPS NEEDS.

DataSafe® 16V batteries save valuable space

EnerSys® engineers set out to develop a true UPS design, front-terminal battery that would be cost effective, space efficient, and easy to maintain.

It also had to be conducive to incorporating monitoring systems, adaptable to existing cabinet designs, and built on proven electrochemistry and design practices.

Finally, the battery had to be capable of scaling to larger capacities to minimize the number of strings in larger UPS systems.

Compared with 12V top-terminated batteries, DataSafe® 16V front-terminated batteries offer several distinct advantages:

- More than 20% space savings for a full 15 minute run time for 750kVA UPS systems
- 925 WPC design reduces the number of parallel strings required
- Up to 50% fewer connections means less maintenance
- No wasted space
- Scales easily to large capacity UPS systems
- Fits within many existing cabinet designs



DataSafe® 16V batteries use 20% less space to deliver a full 15 minutes of run time for 750kVA UPS systems.

DataSafe® Battery Cabinet Systems:

Cabinet System Model Number**	Battery Type	# Units	Voltage	Width Inches	Width mm	Depth Inches	Depth mm	Height Inches	Height mm	1 String System Weight	15 MIN kWB @ 1.67 at 25°C/77°F 1 string	2 string	3 string	4 string
ST65925480B0600A	16HX925F-FR	30	480	50.0	1270	31.5	800	84.0	2134	8960*	222.0	444.0	666.0	888.0
ST64925384B0600A	16HX925F-FR	24	384	50.0	1270	31.5	800	72.0	1829	7448*	177.6	355.2	532.8	710.4
SS65925480B0600A	16HX925F-FR	30	480	60.5	1537	31.5	800	72.0	1829	8960*	222.0	444.0	666.0	888.0
ST65800480B0600A	16HX800F-FR	30	480	50.0	1270	31.5	800	84.0	2134	8500	192.0	384.0	576.0	768.0
ST64800384B0600A	16HX800F-FR	24	384	50.0	1270	31.5	800	72.0	1829	7000	153.6	307.2	460.8	614.4
SS65800480B0600A	16HX800F-FR	30	480	60.5	1537	31.5	800	72.0	1829	8500	192.0	384.0	576.0	768.0
ST65550480B0600A	16HX550F-FR	30	480	32.0	813	31.5	800	84.0	2134	5250	132.0	264.0	396.0	528.0
ST64550384B0600A	16HX550F-FR	24	384	32.0	813	31.5	800	72.0	1829	4400	105.6	211.2	316.8	422.4
SS65550480B0600A	16HX550F-FR	30	480	43.0	1092	31.5	800	72.0	1829	5250	132.0	264.0	396.0	528.0

*** HX925F-FR String consists of two cabinets, each cabinet weight is half the single-string system weight.**
**** Each cabinet system is single-string. For multi-string systems, order multiple cabinet systems.**

data safe

General Specifications

	Inches L	Inches W	Inches H	Millimeters L	Millimeters W	Millimeters H	Weight Lbs	Weight kg	Short Circuit Amps	Internal Resistance (mΩ)
16HX550F-FR	27.2	4.6	12.3	692	117	313	151	68.5	4,070	4.1
16HX800F-FR	27.2	7.0	12.3	692	177	313	232	105.2	6,415	2.6
16HX925F-FR	27.2	7.0	12.3	692	177	313	248	112.5	6,950	2.4

16HX550F-FR

Watts Per Cell @ 77°F (25°C)

Standby Time (Minutes)

End Volts	5	10	15	20	30	45	60	90	120	240
1.75	799	629	517	430	324	239	190	136	106	58
1.70	860	665	543	446	332	242	191	136	106	58
1.67	885	681	550	452	332	242	191	136	106	58
1.65	897	689	554	453	332	242	191	136	106	58
1.63	909	694	556	453	332	242	191	136	106	58
1.60	925	701	557	453	332	242	191	136	106	58

16HX800F-FR

Watts Per Cell @ 77°F (25°C)

Standby Time (Minutes)

End Volts	5	10	15	20	30	45	60	90	120	240
1.75	1103	888	740	634	493	369	297	216	170	93
1.70	1201	951	782	663	508	378	301	216	170	93
1.67	1259	980	800	674	514	378	301	216	170	93
1.65	1289	996	810	680	516	378	301	216	170	93
1.63	1312	1011	818	685	516	378	301	216	170	93
1.60	1345	1029	828	691	516	378	301	216	170	93

16HX925F-FR

Watts Per Cell @ 77°F (25°C)

Standby Time (Minutes)

End Volts	5	10	15	20	30	45	60	90	120	240
1.75	1302	1051	872	726	553	409	327	235	184	101
1.70	1349	1104	914	752	566	413	328	235	184	101
1.67	1350	1127	925	763	566	413	328	235	184	101
1.65	1350	1137	930	765	566	413	328	235	184	101
1.63	1350	1144	933	765	566	413	328	235	184	101
1.60	1350	1150	934	765	566	413	328	235	184	101

1-800-538-3627 | www.savebatteryspace.com

US-HXFT-FL-003 March 2009

EnerSys® Power/Full Solutions

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ENERSYS DE MEXICO SA DE CV
Ave Lopez Mateos #4210
Colonia Casa Blanca • C.P. 66475
San Nicolas de los Garza, N.L. Mexico
Phone: 011-52-818-329-6400
Fax: 011-52-818-329-6489

Go to www.savebatteryspace.com and witness the revolution in UPS batteries.

3. INSPECTION UPON RECEIPT OF GOODS

3.1 General

Special precautions and care have been taken to ensure the cabinet system arrives safe and undamaged. However, upon receipt, you should inspect the entire shipment, including the crate and any boxes for evidence of damage that may have occurred during transit.

3.2 Visible Damage

It is the responsibility of the person receiving the shipment to inventory and fully inspect all materials against the bill of lading or way bill IMMEDIATELY, while the carrier representative is still present. Ensure that all items are accounted for, including number of skids and quantity of boxes. Also note any visible external damage that may have occurred during transit. Make all applicable notations on the delivery receipt before signing and file a damage report with the carrier.

3.3 Concealed Damage

Within 30 days of receipt, unpack the cabinet system and check for any concealed damage. Check the materials received against the detailed packing list to verify the quantity and the condition as complete and satisfactory.

Note any damage to the internal packaging, then request an inspection by the carrier and file a concealed damage claim. If there is a material shortage, contact your EnerSys® representative or call the corporate number listed on the back of this manual.

Please contact your shipping company for all shipping damage. EnerSys is not responsible for any shipping damage.

3.4 Return of Damaged Goods

A RMA number must be obtained before returning equipment to EnerSys. Contact your EnerSys representative or call the corporate number listed on the back of this manual.

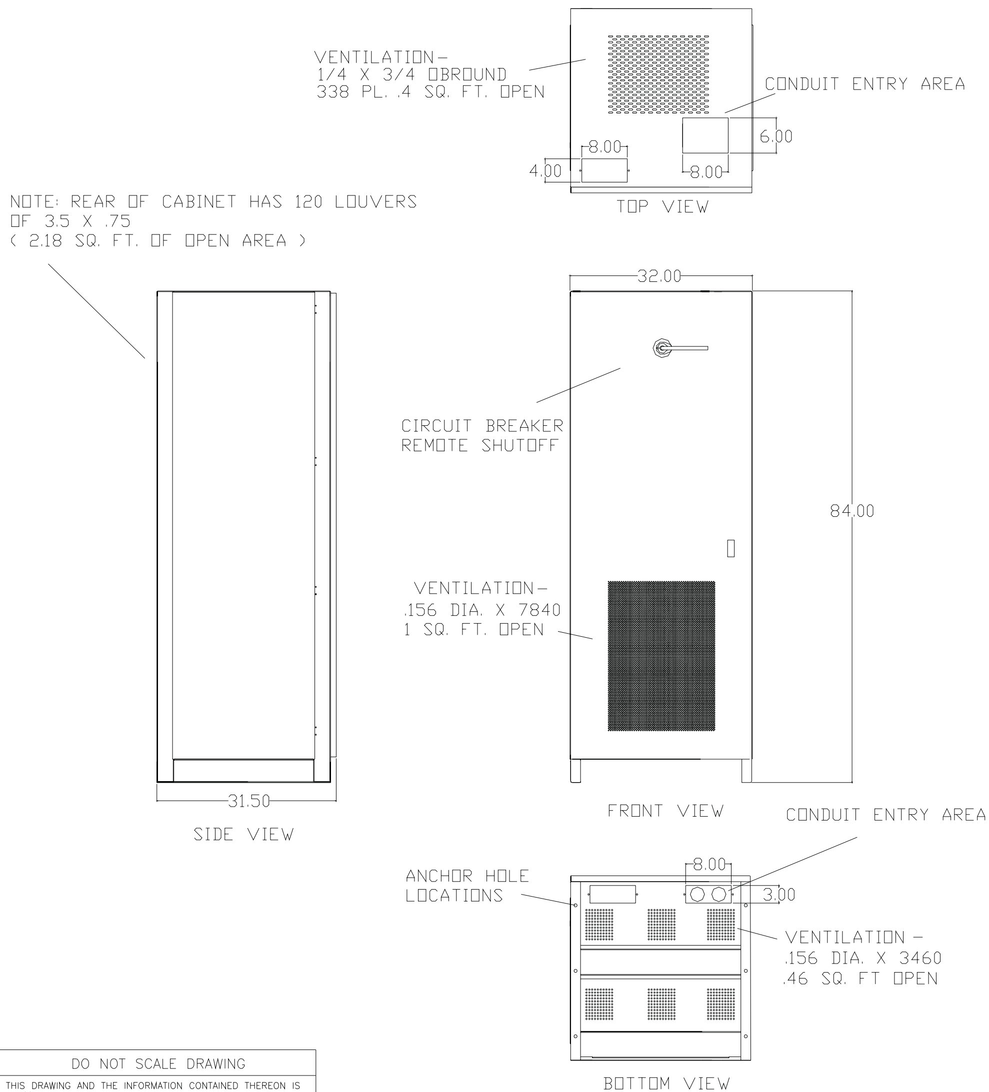
4. SYSTEM OVERVIEW

The enclosed cabinet systems provide the necessary DC backup power required in UPS applications. Over-current breaker/fuse protection is supplied. DC connections are front accessible and made via terminal blocks and/or mechanical lugs. Refer to the drawings and schematics at the end of this manual for these connections. There are 3 holes per polarity on the breaker to accept 250-500 MCM cable. It is highly recommended to run 3 runs of smaller cable into the cabinets and breakers because of tight bend radius requirements in the cabinets; i.e. 3 each 250 MCM cables paralleled for an 800 Amp breaker.

During normal conditions the UPS supplies the load power and the necessary power required to keep the batteries at the proper float voltage. Verify that the charger is set to charge parameters within the approved float voltage range of the batteries, refer to EnerSys Publication No. US-HX16-IOM Battery Operation and Maintenance Manual.

When AC fails, the batteries discharge in order to provide the necessary backup power. It is the responsibility of the customer to make sure the batteries are not discharged below the battery manufacturer's recommendations. Always recharge batteries per the EnerSys Publication No.US-HX16-IOM Battery Operation and Maintenance Manual. Batteries will be damaged if not recharged right away. See the UPS or DC system manual for more information.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	2	PRODUCTION RELEASE	12-1-08	



DO NOT SCALE DRAWING

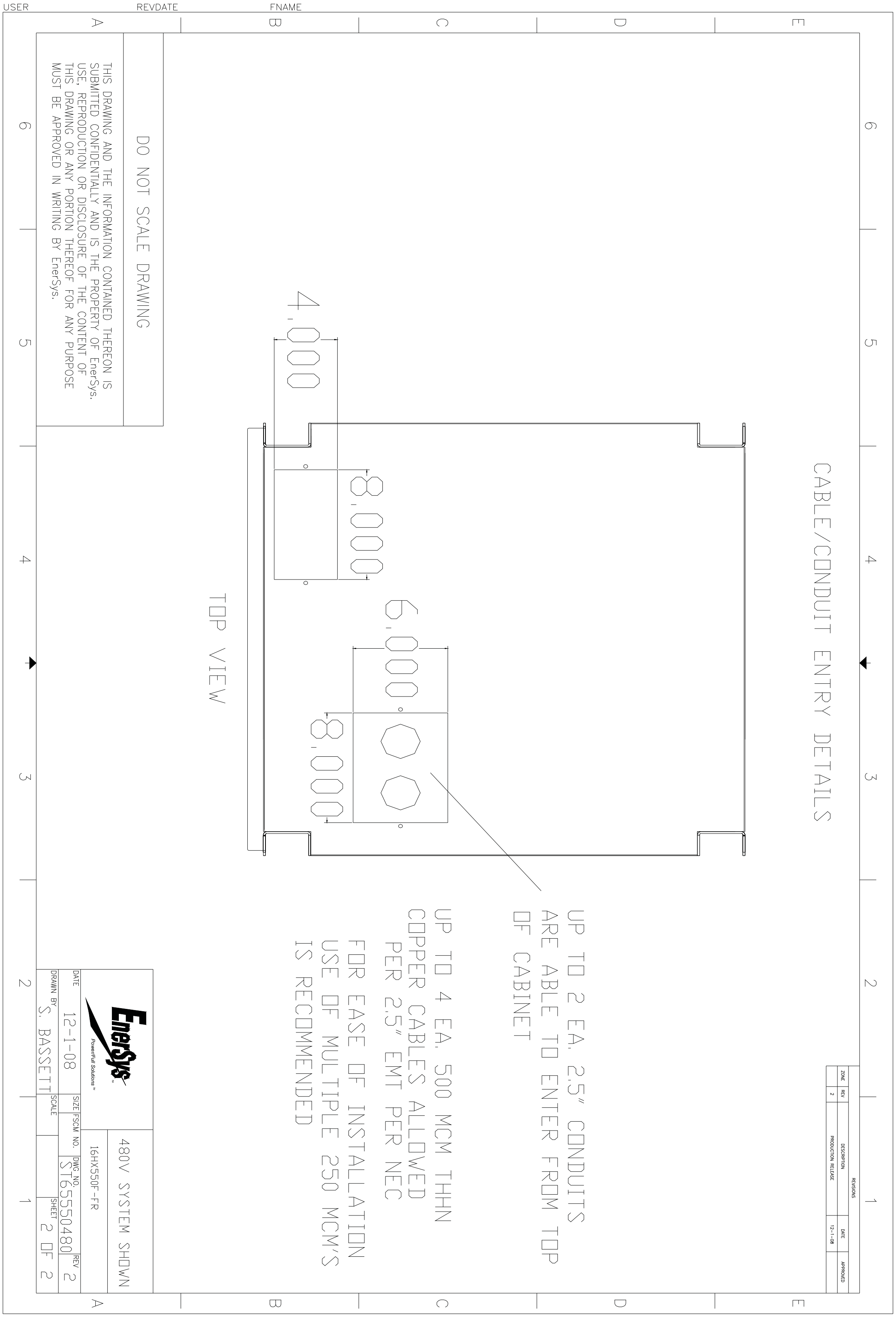
EnerSys Power/Full Solutions™

OVERALL DRAWING OF CABINET SYSTEM DIMENSIONS

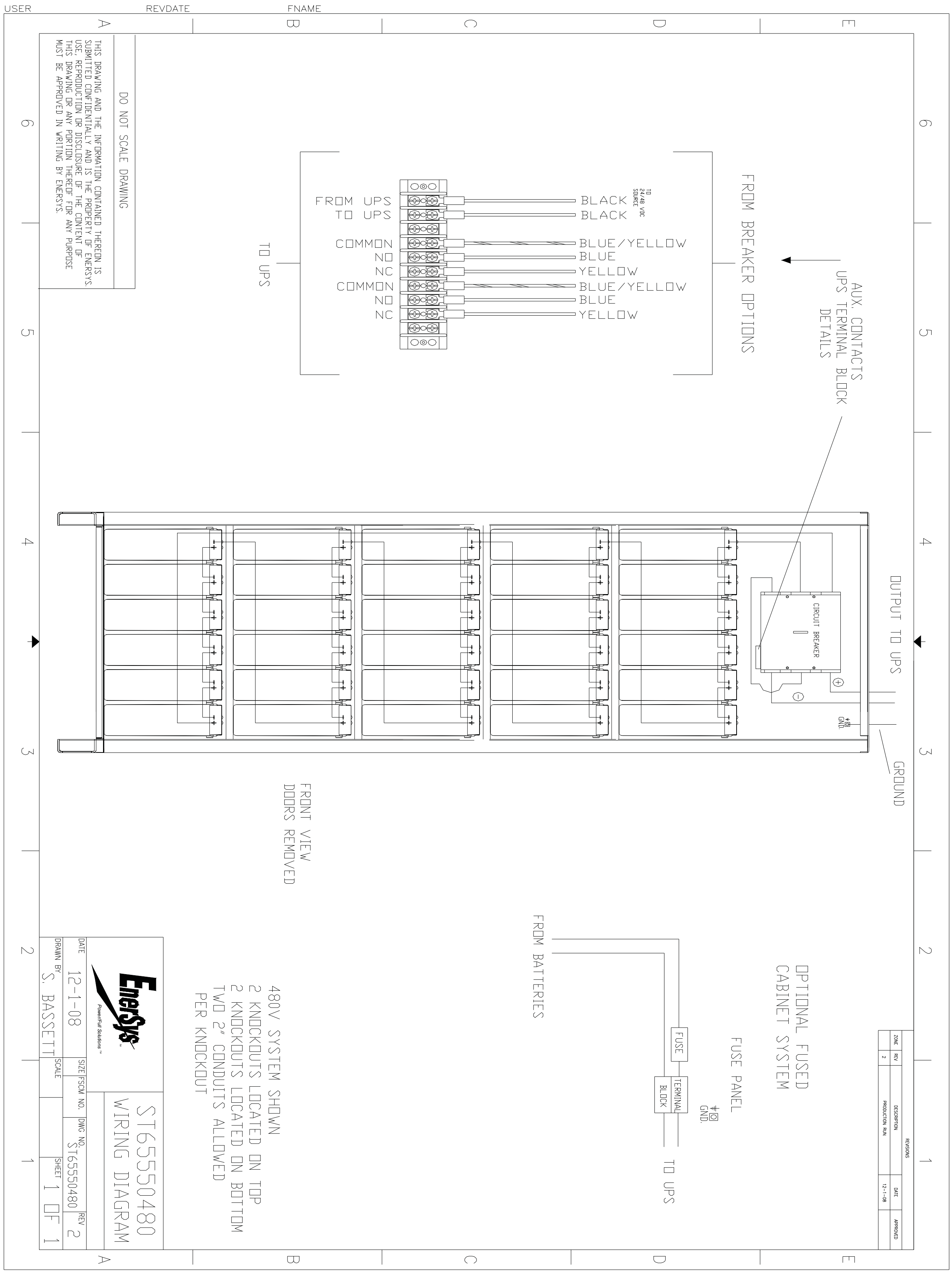
VENTILATION INFORMATION

480V SYSTEM SHOWN,6X5,TOP BREAKER
16HX550F-FR

DRAWN BY	S. BASSETT	SIZE	FSCM NO.	DWG NO. ST65550480	REV 2
DATE	12-1-08	SCALE		SHEET 1 OF 2	



CABLE/CONDUIT ENTRY DETAILS
TOP VIEW
4.000
8.000
6.000
8.000
UP TO 2 EA. 2.5" CONDUITS ARE ABLE TO ENTER FROM TOP OF CABINET
UP TO 4 EA. 500 MCM THHN COPPER CABLES ALLOWED PER 2.5" EMT PER NEC
FOR EASE OF INSTALLATION USE OF MULTIPLE 250 MCM'S IS RECOMMENDED
DO NOT SCALE DRAWING
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480V SYSTEM SHOWN
16HX550F-FR
DATE 12-1-08
DRAWN BY S. BASSETT
DWG. NO. ST6550480
REV 2
SHEET 2 OF 2
REVISIONS
ZONE REV 2 DESCRIPTION PRODUCTION RELEASE DATE 12-1-08 APPROVED


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TO UPS
FROM UPS
TO UPS
COMMON
NO
NC
COMMON
NO
NC
BLACK
BLACK
BLUE/YELLOW
BLUE
YELLOW
BLUE/YELLOW
BLUE
YELLOW
FROM BREAKER OPTIONS
AUX. CONTACTS UPS TERMINAL BLOCK DETAILS
CIRCUIT BREAKER
OUTPUT TO UPS
GND.
GROUND
FRONT VIEW DOORS REMOVED
FROM BATTERIES
FUSE
TERMINAL BLOCK
GND.
FUSE PANEL
TO UPS
OPTIONAL FUSED CABINET SYSTEM
480V SYSTEM SHOWN
2 KNOCKOUTS LOCATED ON TOP
2 KNOCKOUTS LOCATED ON BOTTOM
TWO 2" CONDUITS ALLOWED PER KNOCKOUT
EnerSys PowerFull Solutions
ST65550480
WIRING DIAGRAM
DATE 12-1-08
DRAWN BY S. BASSETT
SIZE
FSCM NO.
DWG NO. ST65550480
REV 2
SCALE
SHEET 1 OF 1
REVISIONS
ZONE
REV 2
DESCRIPTION PRODUCTION RUN
DATE 12-1-08
APPROVED

EnerSys Datasafe 16HX - Electrolyte and Lead Weights (VRLA)

Battery Model	Nominal Capacity AH	Unit Weight		Lead Weight		Electrolyte (1.300)				Acid (H2SO4)			
						Volume		Weight		Volume		Weight	
		lbs.	Kg	lbs.	Kg	Gals.	Liter	lbs.	Kg	Gals.	Liter	lbs.	Kg
16HX500F	120	152	69	115	52	2.1	7.9	22.8	10.3	0.59	2.2	9.0	4.1
16HX800F	205	230	104	175	79	3.5	13.2	38.0	17.22	0.99	3.7	15.0	6.8
16HX925F	220	246	112	191	87	3.4	12.9	36.9	16.73	0.96	3.6	14.6	6.6

All values listed are for the unit. The nominal AH capacity is based on the 8 hour rate to 1.75 VPC final voltage. The nominal temperature is 77 °F (25 °C) and data represents typical product characteristics and is subject to change without notice.

EnerSys DataSafe 16HX - Hydrogen Evolution Rates (VRLA AGM Technology)

A flooded lead-acid battery will produce significant amounts of hydrogen gas when the battery becomes fully charged and remains on float charge. The formula for calculating hydrogen produced by a flooded (vented) lead-acid battery on float is found in our INSTRUCTIONS for INSTALLING and OPERATING FLOODED STATIONARY BATTERIES manual and is copied below (Publication US-FL-IOM). A Valve Regulated (VRLA) type battery recombines 97%+ of the hydrogen it generates as compared to nearly 0% for a flooded cell. The calculation from the formula must be multiplied by 3% to get the generation of hydrogen for a sealed type battery.

Because of the low percentage of hydrogen released EnerSys VRLA batteries are qualified to be used in an office environment with adequate ventilation for human occupancy. The battery is considered non-hazardous because of its low percentage of hydrogen release and for being of a non-spillable type.

Formula for hydrogen evolved:

$$Cw = \frac{FC}{1000} x \frac{Ah}{100} xKxn \qquad Cv = 0.03 \times Cw$$

Cw = Cubic feet (cubic meters) of hydrogen per minute

Cv = Cubic feet of hydrogen per minute for a VRLA battery

FC = Float current in milliamperes per 100 Ah capacity

Ah = Ampere hours (nominal 8h - 1.75Vpc - 25°C)

K = constant 1Ah = 0.000267 cubic feet (7.56 E-6 cubic meters) / minute

n = number of cells

Battery Model	Nominal Capacity AH	Hydrogen Evolution Rates per Battery			
		Float - 2.26 VPC		Boost - 2.40 VPC	
		CFM	ml/day	CFM	ml/day
16HX550F	125	3.20E-06	131	6.68E-05	2722
16HX800F	205	5.25E-06	214	1.09E-04	4445
16HX925F	220	5.60E-06	228	1.17E-04	4771

Notes:

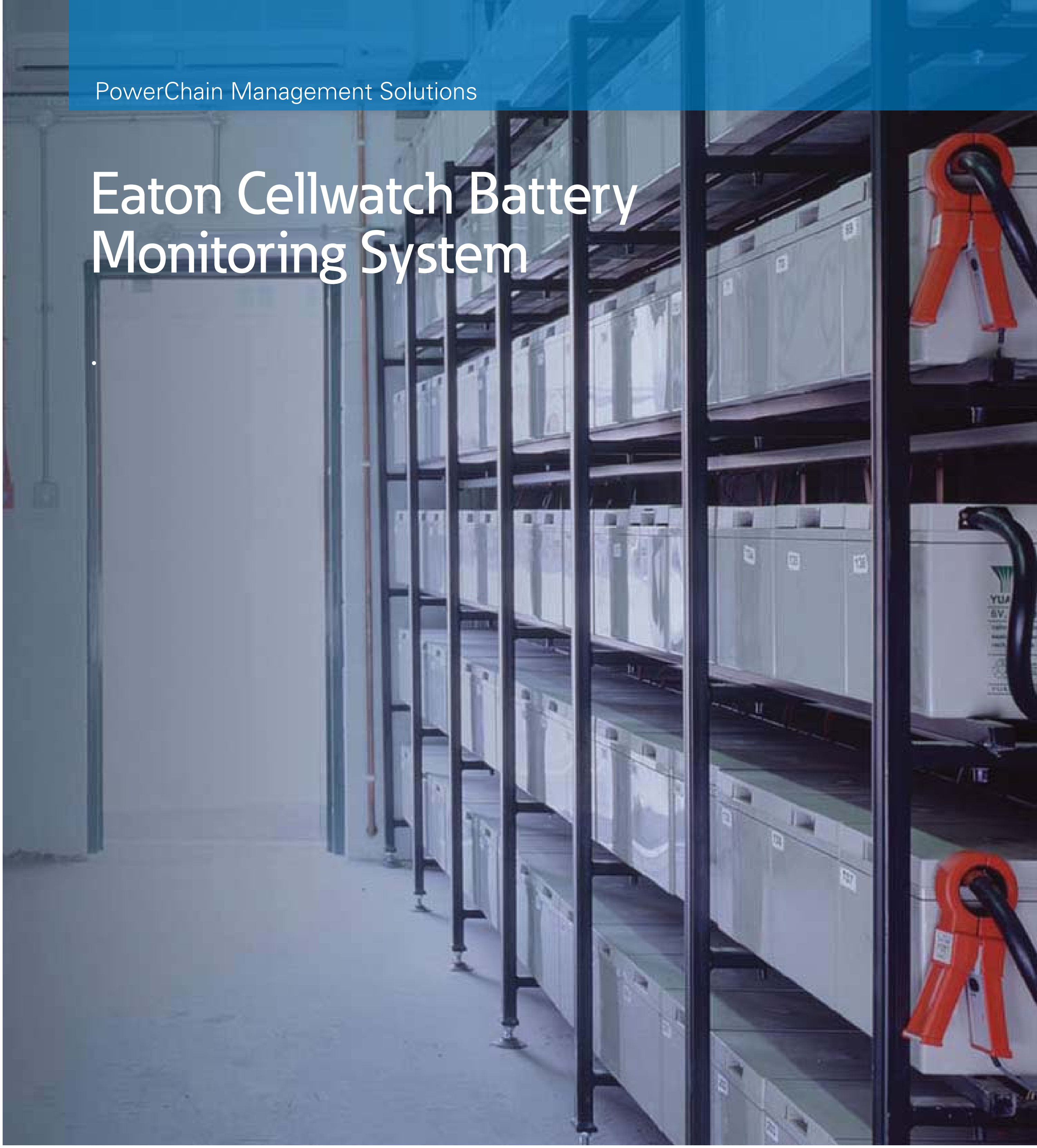
1. The hydrogen evolution rates calculated above are based on an ambient temperature of 77 °F (25 °C).
2. The hydrogen evolution rate doubles for every 15 °F (8 °C) rise above the nominal temperature.
3. The hydrogen evolution rate halves for every 15 °F (8 °C) below the nominal temperature.
4. All values represent typical product characteristics and are subject to change without notice.

BATTERY MONITOR

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PowerChain Management Solutions

Eaton Cellwatch Battery Monitoring System



Powering Business Worldwide



Cellwatch Battery Monitoring System

Businesses that rely on technology for their day-to-day operations cannot afford to risk even a split second of downtime, let alone an extended outage. To keep information technology, telecommunications, factory floor and call center operations running smoothly, businesses have to take a close look at their power infrastructure to identify vulnerabilities and take action to prevent costly downtime.

Central to an effective power infrastructure are UPSs. By ensuring that consistent, quality power is fueling critical systems, UPSs provide a first line of defense against unexpected downtime and load loss, and offer various levels of redundancy, communications and interoperability with other power equipment. Despite advances in UPS technology, however, one truth remains the same: when the power fails, the UPS needs to draw its power from banks of lead acid batteries to feed the critical load until it is able to start and synchronize standby generators. It is well understood that batteries are the most vulnerable part of any UPS and that battery failure is a leading cause of power-related downtime. The more customers know about their batteries, and the more detailed and current that information is, the better their chances of heading off disaster.

Eaton® Cellwatch is an innovative battery monitoring system for large-scale technology installations where power and system availability are critical to successful business operations. Cellwatch is a powerful tool in mitigating and preventing costly downtime due to unexpected battery failure.

Daily battery monitoring increases overall system reliability

Unlike other battery monitoring systems, Cellwatch has been specifically designed to monitor the ohmic value of all jars in the battery every day. By avoiding random sampling of jars, which can miss a failing cell, Cellwatch dramatically increases the likelihood of identifying a potential problem before it becomes a crisis. Cellwatch's unique design uses a very light test load, combined with superior electrical noise filtering techniques, enabling timely battery replacement or other preventive action. Cellwatch is a critical part of ensuring availability and saving money by:

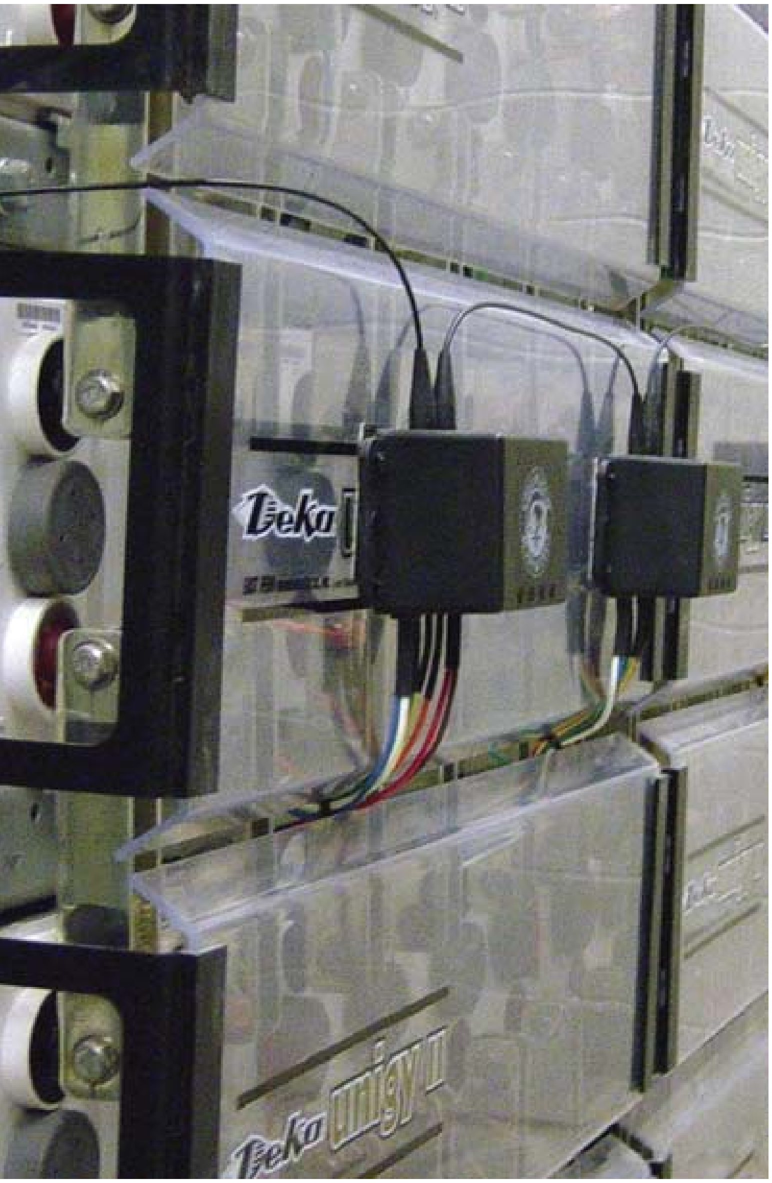
- Providing a window to the battery with continuous, accurate monitoring and alarm notification
- Offering clear information in the form of graphs for forensic analysis
- Reducing manpower demands and increase safety during maintenance
- Extending the life of the batteries through efficient and rapid preventative maintenance

Cellwatch consists of three basic components: the data collection module (DCM), the battery monitoring unit (iBMU) and the control unit. It also offers an optional generator extender kit. The DCM is connected directly to the battery cells or jars and gathers the information on battery health. The control unit provides the interface between the DCM and the iBMU. The iBMU is a PC running the Cellwatch application software and provides the graphical reporting on the status of the battery system. The iBMU can integrate with the BMS or NMS, simplfying battery management. The generator extender kit enables the generator start batteries to be monitored.

Cellwatch is the only system that can monitor different jar voltages with the same system. Each DCM is capable of monitoring two-, four-, six-, eight- and 12-volt jars. This capability enables Cellwatch to provide a total solution, leaving no critical batteries in the power system unmonitored.

Cellwatch is ideal for applications and industries that require long battery runtimes, and where any downtime can cascade into a very costly scenario, including:

- Telecommunications
- Tier 1 and Tier 2 data centers
- Manufacturing

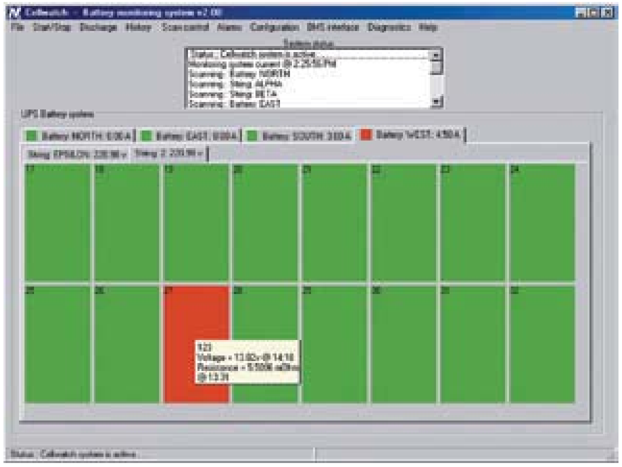


At-a-glance battery status

Cellwatch provides graphical representation of status at a system, battery and cell level. This gives you an unprecedented view into the daily health of your batteries.

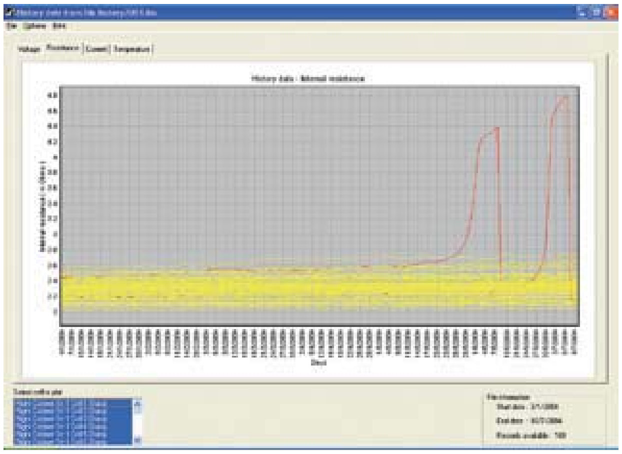
Battery status at a glance

Cellwatch gives you a simple view of the battery with clear indications of a good or bad cell or jar, including the cells on your generator batteries.



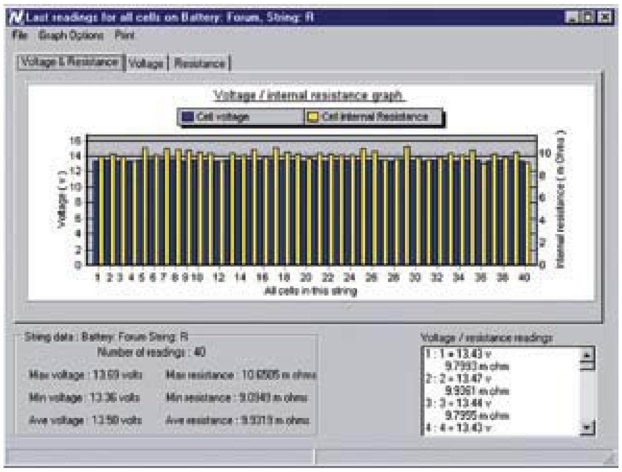
Ohmic value history

A rapid rise in the cell or jar's ohmic value indicates cell failure. Ohmic value of failing cells can rise to twice its normal value within days. At this point your battery may be compromised and immediate action is required.



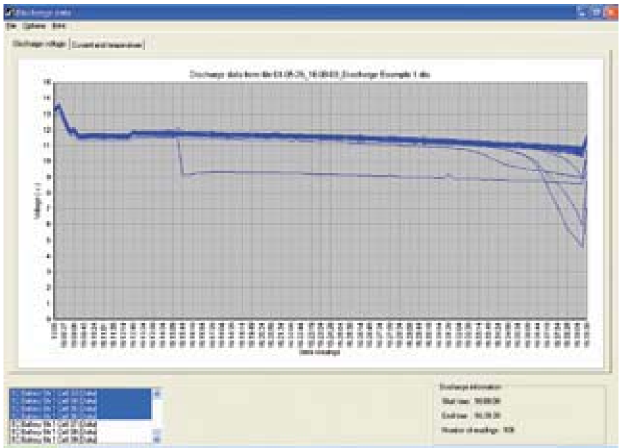
Ohmic values and inter-cell resistance across strings

This graph makes it easy for you to compare a string of cells or jars within the battery. If the reading is higher than the others there is a problem.



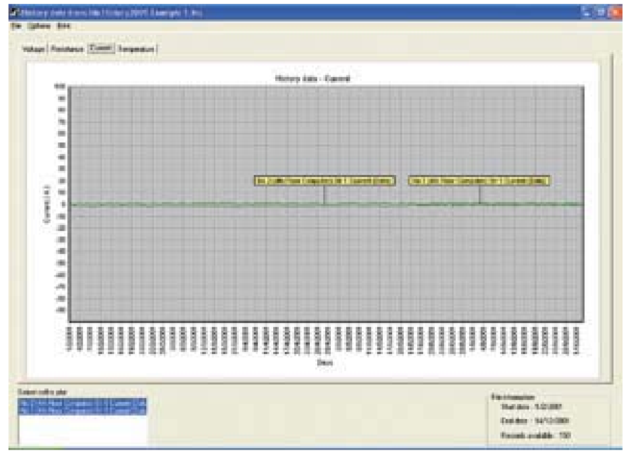
Cell voltage performance on load

Cellwatch automatically monitors discharges and can track over 1900 readings a minute. This capability provides the data for a very detailed map of individual cell or jar performance on load.



Battery current over time

Cellwatch shows you how much current the batteries are taking during normal float charge. An increase in current could indicate a problem.



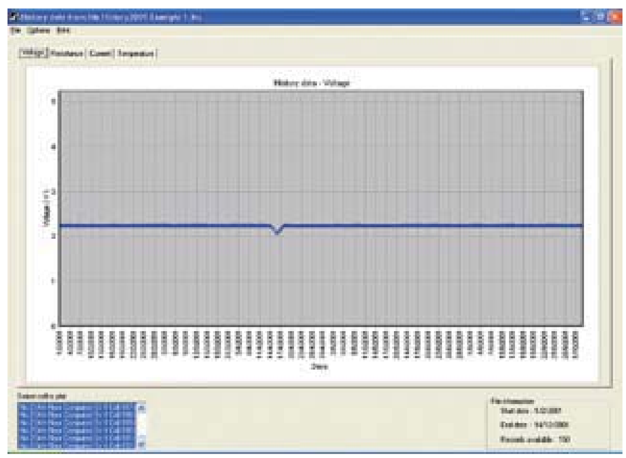
Battery pilot and battery ambient temperature over time

Cellwatch provides data on how hot the batteries are getting. If they are too hot, battery life is compromised. If they are too low, then performance is compromised.



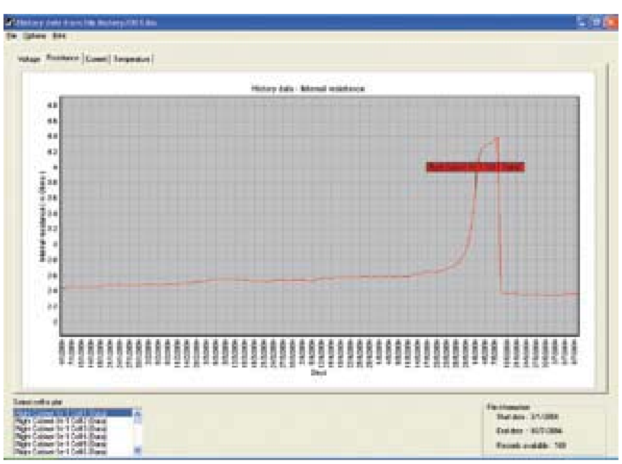
Float voltage over time

This view lets you see how well the UPS charger/rectifier is working.



Individual cell/jar history

Cellwatch plots each individual cell or jar history to give early warning or changes in battery condition and allow you to be proactive in battery maintenance.

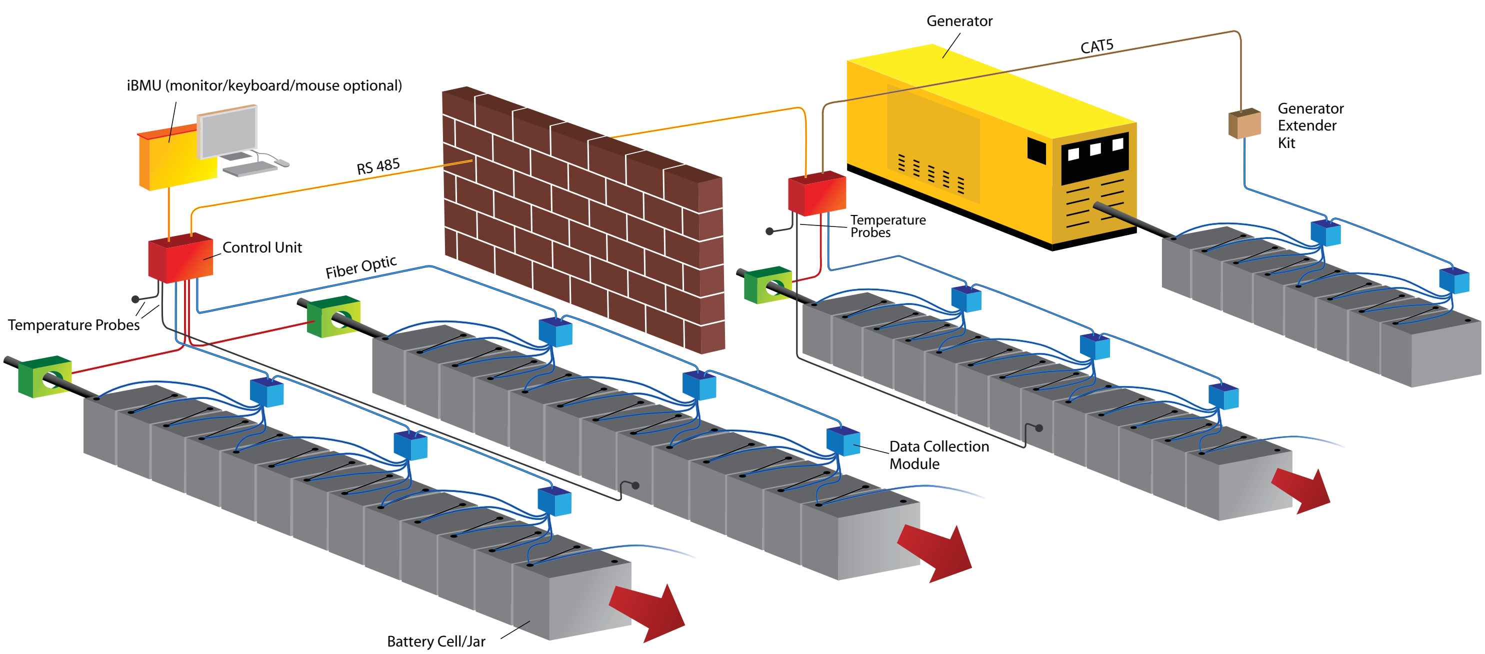




Fast installation—immediate results

Cellwatch's modular format allows for easy installation and expandability. Its layout design minimizes wiring on the battery, increasing reliability and ease-of-installation. Cellwatch uses optical fiber that reduces electrical noise that can negatively impact battery performance.

Cellwatch Battery Monitoring



Specifications

Control Unit

Operating Specifications

Ambient operating temperature	0°C to 50°C/32°F to 122°F
Storage temperature	10°C to 80°C/50°F to 17°F
Power supply	Manually switchable 110 Vac or 230 Vac
Power supply range	80 Vac to 135 Vac 160 Vac to 270 Vac
Power supply frequency	50 Hz to 60 Hz
Power supply rating	Max 5 VA (15 mA quiescent current)

Communications

RS-485 interface	Input and output with optional jumper for termination
Max range	2000 ft (619m) total bus length
Fiber optic range	150 ft (50m) CU to DCM, DCM to DCM
Max CUs per RS-485 bus	31

Alarm Outputs

Output relays	4 relays, single contact, volts free
Contact rating	30 Vdc @ 8A max
Electrical isolation	1500 Vac
Service life	50 million operations, typical

Protection

Sensing inputs	Short circuit proof
Insulation resistance	600 Vdc

Sensing inputs

Temperature sensor	Solid state probe
Resolution	0.05°C
Accuracy	±1°C
Range	2°C to 80°C/35°F to 176°F
Mounting	0.31 in. (8 mm)
Current sensor	Solid state, ferrite core clamp
Sensitivity	1 mV/1A
Resolution	0.5A (optional 1.25A)
Useful range	±25 to 1000A (optional 50 to 2500A)

Physical characteristics

Dimensions (H x W x D)	4.75 x 11.88 x 11.75 in.
Enclosure material	Steel with powder coating
Color	Pebble gray

Battery Monitoring Unit (iBMU)

Computer characteristics

Operating system	Microsoft Windows XP Professional
Software	Cellwatch Applications
Hard drive	60 GB

Physical characteristics

Dimensions (HxWxD)	3.5 (2U) x 19 x 21 in.
Enclosure material	Steel with powder coating
Color	Black
Mounting	19 in. rack with optional wall mount kit

Data Collection Module

Voltage measuring characteristics

Voltage measuring range	0 to 60 volts
Resolution	15 mV
Accuracy	2 volts nominal source ±1.0% 6 volts nominal source ±0.5% 12 volts nominal source ± 0.25%

Protection

Transient suppression pulses non repetitive	Up to 600V, 1 kW at 100uS
Short circuit	5A max with in line fuses fitted
Reverse polarity protection	Any combination in any connection order, for any period of time within the rated voltage

Ohmic value measuring characteristics

Ohmic value measuring range	0.25 to 25.9 mOhms
Resolution	10 uOhms
Temp coefficient of reading	3 uOhms/°C (-5°C to 80°C/23°F to 176°F at nominal 1uOhm)
Max DCMs per control unit	254

Fiber optic loop

Fiber optic range	Min 6 in. (150 mm) max 150 ft (50m)
Input cable lengths	Min 4 in. (100 mm) max 16 ft 6 in. (5m)
Max variation between cables on one unit 6 ft 6 in. (2m)	

Temperatures

Operating temperature	0°C to 35°C/32°F to 95°F
Storage temperature	0°C to 80°C/32°F to 176°F
Power supply nominal	4 x 2V cells up to 4 x 12V jars
Power supply voltage	Min 7 Vdc, max 60 Vdc

Operating current

Quiescent current	15 mA
During ohmic test	Additional 0.0027A/hr

Physical characteristics

Dimensions	2.53 x 4.63 x 1.84 in.
Mounting pads	2 in. 3M Dual Lock
Enclosure material	Flame retardant ABS
Color	Black

Generator Extender Kit

Operating voltage	12 volts
Operating temperature	0°C to 35°C/32°F to 95°F
Storage temperature	0°C to 80°C/32°F to 176°F
Communications	Proprietary over CAT5 c able
Max range	4000 ft (1219m)
Fiber optic range	150 ft (50m) remote to DCM, DCM to remote

Dimensions (HxWxD)

Remote	2.63 x 4.5 x 1 in. 65 x 110 x 26 mm
Master	2.44 x 4 x 1.19 in. 62 x 122 x 30 mm

The control unit and DCM are fully compliant with CE and UL regulations for EMC. See manual for details.

SITE TESTING

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Powering Business Worldwide

Start-Up Scope of Work
Attachment L-2

This scope of work is shared by UPS, Eaton DC, Eaton PDU/PDR/RPP/STS, Flywheel, Non Eaton UPS and Distributed Bypass. The following is an outline of general procedures and tests, if applicable, that are normally performed by Field Service Personnel during the course of a standard start-up for new units or to recertify and restart a previously started UPS. All checks and processes may not be applicable to all equipment models.

UPS/PDU/RPP/STS START-UP PROCEDURE

1. **VISUAL INSPECTION**
   - 1.1. Visually inspect all equipment for signs of shipping damage and/or foreign materials.
   - 1.2. Check all battery cells for proper electrolyte levels.
   - 1.3. Observe type of ventilation, room cleanliness, use of proper signs and any safety related items that may be noteworthy

2. **MECHANICAL INSPECTION**
   - 2.1. Check internal power connections in UPS module for tightness while observing proper safety precautions.
   - 2.2. Check all control wiring terminations and plugs in UPS module for tightness and/or proper setting.
   - 2.3. Check to see that all factory connections, power modules, subassembly pans and legs are secure.
   - 2.4. Inspect the ISBM or IOM (inspect auxiliary connections)

3. **ELECTRICAL PRECHECK**
   - 3.1. Check system for ground faults at all power inputs and outputs
   - 3.2. Check DC bus for short circuits and proper polarity.
   - 3.3. Checks input and bypass power terminations for proper voltages and phase rotation inside all modules.
   - 3.4. Check and adjust, if necessary, all power supply voltages.
   - 3.5. Verify CTO and Serial numbers programmed into system match the equipment labels

4. **INITIAL UPS, PDU ENERGIZATION**
   - 4.1. Verify all system annunciations are in "go" condition.
   - 4.2. Energize unit(s) and verify proper DC walkup and AC phase on.
   - 4.3. Check DC link holding voltage, AC output voltages and output waveforms.
   - 4.4. Check final DC link voltage and inverter AC output. Adjust if required.
   - 4.5. Check for proper synchronization with bypass source.
   - 4.6. Check voltage differences between inverter outputs and bypass source.

5. **INITIAL DC SYSTEM ENERGIZING**
   - 5.1. Installation of one rectifier
   - 5.2. Initial power up of equipment
   - 5.3. Verification of correct voltage / polarity for rectifiers
   - 5.4. Installation of all rectifiers
   - 5.5. Verification of proper operation of rectifiers
   - 5.6. Verification of proper operation of the system controller

6. **BATTERY SET-UP**
   6.1. Determine common or separate battery set-up process and settings
   6.2. Check for proper cell interconnections with respect to polarity throughout battery.
   6.3. Check battery configuration matches required unit configuration (voltage, polarity, number of cells per string)

7. **BRANCH CIRCUIT MONITORING SET-UP (if optionally purchased)**
   7.1. Ensure installation configuration matches application
   7.2. Perform branch circuit breaker scheduling
   7.3. Check voltage and current calibrations

8. **OPERATIONAL INSPECTION**
   8.1. Check proper system operation in Normal Mode, Bypass Mode, and Battery Mode
   8.2. Check system transitions between operating modes
   8.3. Check multi-module operations
   8.4. Verify system calibrations and adjust as necessary

9. **FUNCTIONAL TEST**
   9.1. Test Battery mode
   9.2. Simulate the loss of bypass when on battery testing
   9.3. Perform ISBM loss of logic power testing
   9.4. Emergency transfer testing
   9.5. Local and Remote Emergency Power Off testing
   9.6. Mini CSB Failure testing
   9.7. Fan Failure Test (ONLY PERFORM IF NO LOAD IS APPLIED)
   9.8. Building Alarms testing
   9.9. Basic Easy Capacity testing

10. **INSTALL OPTIONAL CONNECTIVITY AND MONITORING**
   10.1. Upon customer enrollment and request (www.powerquality.eaton.com/enotify, select "Install eNotify", and complete an "eNotify Request Form"), install and program connectivity parts and test monitoring connection. Customer must enroll and authorize Eaton to provide monitoring (connectivity parts may require separate purchase); customer may self install eNotify or purchase a separate installation if not completed at startup.

11. **INSPECTION COMPLETION**
   11.1. Ensure dead fronts and door panels are reinstalled
   11.2. System will be left in normal mode when environmental controls are operational
   11.3. Conduct on-site customer system operation training
   11.4. Final EEPs, calibration EEPs, meters report, service log, and configuration reports will be downloaded and stored
   11.5. Startup data forms and reports are available as required.
   11.6. Clean up tools and debris around the system.

FLYWHEEL UNITS ONLY (Varies by Flywheel type)

1. **MECHANICAL INSPECTION**

1.1. Check internal power connections in Flywheel module for tightness while observing proper safety precautions
1.2. Check all control wiring terminations and plugs in Flywheel module for tightness and/or proper setting
1.3. Check to see that all subassembly heat sinks are secure
1.4. Verify bearing and hardware installation

2. ELECTRICAL PRE-CHECK

2.1. Check Flywheel system for grounds
2.2. Check DC bus for short circuits
2.3. Check power terminations for proper voltages
2.4. Check and adjust, if necessary, all power supply voltages
2.5. Check all lamp test functions
2.6. Verify auxiliary power supply
2.7. Check cooling fans
2.8. Verify internal operations

3. INSTALLATION VERIFICATION (power system configuration dependant on Flywheel type)

3.1. Verify power wiring to and from the UPS system has been properly installed
3.2. Verify correct polarity of all Flywheel DC cabling to the UPS and battery *
3.3. Verify grounding from Flywheel to the UPS cabinet, and all battery cabinets *
3.4. Ensure that the auxiliary power ground is on the same ground plane as the UPS and Flywheel

4. INITIAL UNIT ENERGIZATION

4.1. Verify all system annunciations are in "go" condition
4.2. Energize unit and verify proper DC walkup and Flywheel RPM
4.3 Verify that vacuum is adequate and stable

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Capitol Power
Critical Power Solutions

EATON AUTHORIZED Representative

Park Center Building A: UPS Load Bank Test Procedure

Eaton will provide a load bank with cable, test equipment (Fluke 87III or equivalent, Fluke i410 Amp lamp or equivalent, Fluke 123 Oscilloscope or equivalent, and laptop with service tool) and a Field engineer to load bank test the UPS System. The customer is responsible to have a qualified electrician on site during the testing and to connect and disconnect the load bank to the UPS System. The customer is also responsible to provide a location suitable for the load bank equipment within a distance of the load bank cables provided.

Testing to consist of the following:

A. UPS Module and System Operational and Functional Tests

The UPS module and system controls, alarms, remote panels and meters shall be tested for proper operation. All modes of operation shall be tested to assure system operates in accordance with specifications.

B. UPS Module and System Steady-State Tests

Measure and/or record UPS module input and output AC voltage, current, frequency, kW, kVA and power factor, DC voltage and current, and regulation under the following conditions:

- No Load
- 25% Load
- 50% Load
- 75% Load
- 100% Load

C. UPS Module and Transfer Tests

Perform the following transfers and verify proper operation:

- No Load *to* 50% Load *to* No Load
- 50% Load *to* 100% Load *to* 50% Load
- No Load *to* 100% Load *to* No Load
- 100% Load, Loss of Input Power
- 100% Load, Loss of Bypass Source
- 100% Load, Loss of Battery
- 100% Load, Manual Transfer to Static Bypass and Re-transfer to UPS
- 100% Load, Manual Transfer to/from Maintenance Bypass
- 100% Load, Automatic Transfer to Bypass (Module Fault Condition)
- Restoration of Input Power (Power Walk-in & Inrush Current)

D. Heat Run

Operate UPS system at 100% full load redundant operation for a 3.5 hour period. Record voltage, current, frequency, kW, kVA, and power factor during the burn in each ½ hr. (This will be a meters

snapshot).

E. Battery Discharge Testing (at owner's discretion)
Manufacturer shall verify the operation of the Battery Systems

- Visual inspection of battery jars and enclosures for evidence of physical
- damage, leaking, corrosion, overheating, arcing, or burning.
- Perform a partial battery discharge test on UPS battery system under full load
- conditions. (5 Minute discharge)
- Verify operation of Battery Notices and Alarms

F. Report
Eaton Powerware Field Engineer to provide a written report verifying the operation of the UPS System.

50kVA PDU

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Power quality solutions

Power Distribution Unit

Front and rear access



The Eaton line of three-phase power distribution units (PDUs) provide robust power distribution that can be easily tailored to meet the design specifications of any facility or data center. The PDU offers ratings from 50 to 300 kVA and K13 and K20 transformers, including TP-1 efficiency. Energy Management System (EMS) offers cost effective intelligence to manage load efficiency.

Easy Service and Setup

Reduce installation time and save on startup costs

- Backed by Eaton's extensive network of over 240 field technicans for fast reliable service
- Ample cabling space between panelboards and for subfeed breakers
- Standard top and bottom cable access for more flexible installation options
- Front access for operation and general service requirements
- Easily removable side and rear covers with captive hardware
- Front access control panel for all standard communication expansion and maintenance

Monitoring and Connectivity

To understand your power profile

- Eaton's Energy Management System (EMS) provides state-of-the-art monitoring and alarming provisions
- PXGX PDP communication card allows for daisy chaining multiple PDUs together, reducing individual network drops to your power equipment
- Monitor the PDU from any computer without software through the integrated web interface, or easily integrate into existing building management systems or Eaton's Power Xpert Software
- Stores consumption trends for up to 24 months
- Up to 100A branch breaker CTs available
- **Auxiliary contacts to interface with third-party monitoring for subfeed breaker positions**

Safety

Protecting employees, contractors and service personnel

- Protective trim panels cover panelboard bus/breakers/wiring from accidental contact
- Separation of Low/High/Control voltage sections for safer servicing
- UL/CSA approved 60950
- **Shunt trip in subfeed breakers**

Aesthetics and Flexibility

Providing the right form-factor for demanding applications

- Durable finish gives a clean professional appearance to facilities and data centers
- Side car options to expand distribution capacity

Available Options

- Panelboards with 400A panel main breaker
- Additional subfeed breakers
  - 225A (50-150kVA)
  - 225A/400A (200-300 kVA)
- Branch circuit monitoring up to 100A per branch CT
- Plexiglas see-through doors
- Input and ground compression lug provisions
- Air skirts
- Dual input with manual kirk key or sync check interlock
- Lockout breaker tabs
- Auxiliary and shunt trip main cabinet subfeeds
- No local Emergency Power Off option
- Field upgradable capabilities

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Powering Business Worldwide

TECHNICAL SPECIFICATIONS[1]

Category	Up to 150 kVA	~~200-300 kVA~~
ELECTRICAL CHARACTERISTICS		
kVA	50 / ~~75 / 100 / 125 / 150~~	~~200 / 225 / 300~~
Input Ratings	~~208 / 380 / 400 / 415~~ / 480 / ~~600V~~ 3 Phase, 3 Wire + Ground (Single ~~& Dual~~ Input) ~~Dual Input: Basic or Premium[5]~~	
Output Ratings	208V - 3 Phase, 4 Wire + Ground	
Frequency	60 Hz	
Transformer Type	Copper / Double Shielding / Class R (220°C) Insulation	
Transformer Characteristics	150°C Temp. Rise / ~~K13 (Std.)~~ & K20 ~~(Opt.) / Std. &~~ TP-1 Efficiency	
Transformer Compensation Taps	(4) 2 - 1/2% FCBN / (2) 2 - 1/2% FCAN	
Neutral Rating	200%	
POWER DISTRIBUTION		
~~Panelboards~~	~~Up to (6) 42-pole Panels - (2) Panels in Main Cabinet & (4) Panels in Sidecars[2]~~	
~~Panelboard Options~~	~~Cutler-Hammer (Bolt-on or Plug-on) or SquareD Panels (225A & 400A Main Breakers)~~	
Main Cabinet Subfeed Breakers *80% ~~or 100%~~ (CH only) rated*	(6) 60A Subfeeds	~~Up to (12) 225A Frame[2,4]~~ ~~Up to (5) 400A Frame[2]~~ ~~Up to (3) 600A Frame[2]~~
~~Branch Breaker~~	~~Factory installed branch circuit breaker[3]~~	
~~Additional Subfeed Breakers~~	~~Up to (2) 225A Frame~~	~~Up to (2) 225A Frame or (1) 400A Frame~~
~~Sidecars~~	~~Up to (2) Front or Side Facing Sidecars~~	
~~Sidecar Options~~	~~(2) 42-pole Panels or (4) 225A Frame Subfeeds (each Sidecar)~~	
DIMENSIONS		
Main Cabinet	39"W x 35"D x 80"H	~~44"W x 35"D x 80"H~~
~~Front Facing Sidecar~~	~~24"W x 35"D x 80"H~~	
~~Side Facing Sidecar~~	~~9.5"W x 35"D x 80"H~~	
STANDARDS		
	NEMA, UL 60950, CSA 60950	

1. Due to continuing improvements, specifications are subject to change without notice.
2. Please see sales configurator for additional information.
3. Branch breaker schedule required at time of order.
4. When using optional PRL3 chassis, a maximum of (8) 225A Frame breakers can be installed.
5. Dual Input requires a Right Hand Sidecar.

Options

- ~~Dual Input[5]~~
- ~~Branch Circuit Monitoring~~
- ~~100% Rated Sub-Feed breakers~~
- ~~100% Rated Panel Main breakers~~
- Subfeed Breaker Monitoring
- High kAIC main input ~~and subfeed breakers~~
- Surge Protection Device ~~(100 or~~ 200kA) UL1449
- ~~Lightning Arrestor~~
- ~~Transient Suppression Plate~~
- ~~Isolated Ground *(Standard)*~~
- ~~Clear Plexiglas Doors~~
- Load Bank Test Lugs (standard)
- ~~Lockout Breaker Tabs~~
- Air Skirts
- ~~Floor Stands - seismic (12", 18", 24", 36" & 48")~~
- ~~High Voltage Input Junction Box~~
- ~~Low Voltage Control Junction Box~~
- ~~Input & Ground Compression Lugs~~
- ~~Dual Input Basic with Kirk Key Interlock~~
- ~~Dual Input Premium with Sync Check~~

General

- Natural Convection Cooling
- All Swivel Casters
- System Level Metering Included
- 8 x 40 Character LDC Display
- Top & Bottom Entry
- Protective Trim Panels
- Cable management for Input & Panel Wiring
- (2) X-Slots for Communication

Control

- ~~Local EPO (optional)~~
- REPO provisions
- Up to 4 Building Alarm Inputs (N/O or N/C)

Optional custom shutdowns on alarms:

- **Phase Rotation/Loss**
- **Ground/Neutral Overcurrent**
- **Transformer Overtemperature**
- **Output Overload**
- **Input Voltage Out of Tolerance**
- **Frequency Out of Tolerance**

Energy Management System

Monitored Parameters

- Input voltage (L-L & L-N)
- Output voltage (L-L & L-N)
- Output current (A,B & C Phases)
- Output neutral current
- System ground current
- kVA, kW, Hz
- Monthly, yearly, total output kWH
- Input voltage THD (all phases)
- Output voltage THD (all phases)
- Power factor (lead/lag indicator)
- Output current % (A, B & C phases)

Load Profiling

Captures highest and lowest reading on monthly basis with trend information over the last 24 months

- Input/Output Voltage
- Output Current
- Input/Output Frequency
- Output Power Factor
- Output kVA
- Input/Output Voltage THD
- Ground and Neutral Current

Warnings/Alarms

- Over-temp & shutdown
- Input/Output over- & under-voltage
- Input/Output over- & under-frequency
- Input/Output phase rotation
- Input/Output voltage and current THD
- Output Overload (3 Levels)
- Remote EPO
- Building Alarms (4 programmable)
- Summary Alarm
- Communication Fault

Connectivity

- ~~Modbus RTU (RS232/485)~~
- Power Xpert Gateway Card - PXGX PDP (Modbus TCP/IP, SNMP, Ethernet)



~~Aux and Shunt~~



~~Single Input Crimp Lug~~



~~EPO or~~ No EPO Option

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Table B. Equipment Weight – Front Service Access PDUs

Component	Rating kVA	Maximum Weight kg (lb) Shipping	Installed	Point Loading
PDU	150	1207 (2662)	1170 (2580)	4 at 293 (645)
PDU with single front-facing sidecar	150	1478 (3258)	1423 (3137)	4 at 356 (784)
PDU with single side-facing sidecar	150	1399 (3084)	1357 (2992)	4 at 339 (748)
PDU with dual front-facing sidecar	150	1748 (3854)	1676 (3694)	4 at 419 924)
PDU with dual side-facing sidecar	150	1590 (3506)	1544 (3404)	4 at 386 (851)
PDU with single front-facing sidecar and single side-facing sidecar	150	1669 (3680)	1610 (3549)	4 at 403 (887)
PDU with dual input sidecar	N/A	N/A	N/A	N/A
PDU with dual input sidecar and single front-facing sidecar	150	1686 (3718)	1614 (3558)	4 at 404 (890)
PDU with dual input sidecar and single side-facing sidecar	150	1608 (3554)	1548 (3413)	4 at 387 (853)

5. The recommended clearances around the PDU cabinet are shown in Table C. The clearances specified allow the doors on the cabinets to open a full 180°.

Table C. PDU Cabinet Clearances

From the Top of the Cabinet	Minimum 457.2 mm (18") for ventilation
From the Front of the Cabinet	914.4 mm (36") working space
From the Back of the Cabinet (if side access is available)	Minimum 101.6 mm (4") for ventilation 508 mm (20") for side-facing sidecar door clearance
From the Back of the Cabinet (front only service access PDU)	Minimum 101.6 mm (4") for ventilation 508 mm (20") for side-facing sidecar door clearance
From the Back of the Cabinet (if side access is not available)	Minimum 914.4 mm (36") for working space
From the Right or Left Side of the Cabinet (PDU only, no sidecars)	Minimum 914.4 mm (36") from one side for working space or rear access 508 mm (20") for door clearance
From the Right or Left Side of the Cabinet (PDU and front-facing sidecars)	Minimum 914.4 mm (36") from one side for working space or rear access 610mm (24") for door clearance
From the Right or Left Side of the Cabinet (PDU and side-facing sidecars)	Minimum 914.4 mm (36") for working space or rear access

6. The basic environmental requirements for PDU operation are:
   - Ambient Temperature Range: 0–40°C (32–104°F)
   - Recommended Operating Range: 20–25°C (68–77°F)
   - Maximum Relative Humidity: 95%, noncondensing

The PDU cooling requirements are shown in Table D.

Table D. PDU Cooling Requirements During Full Load Operation

Rating		Voltage		Heat Rejection		
kVA	K-factor	Input	Output	Watts	BTU/hr	Kg-cal/hr
50	13	208	208/120	1118	3814.77	961.31
50	13	480	208/120	2018	6885.70	1735.17
50	20	480	208/120	2020	6892.53	1736.89
75	13	208	208/120	2640	9008.05	2269.99
75	13	480	208/120	3415	11652.46	2936.37
75	20	480	208/120	2214	7554.48	1903.70
100	13	480	208/120	5590	19073.87	4806.53
100	20	480	208/120	5438	18555.22	4675.84
125	13	480	208/120	3872	13211.81	3329.32
125	20	480	208/120	2903	9905.45	2496.13
150	20	208	208/120	3200	10918.85	2751.50
150	13	480	208/120	5506	18787.25	4734.31
150	20	480	208/120	5410	18459.68	4651.76
150	13	600	208/120	3445	11754.83	2962.17

Table J. Input/Output Ratings and External Wiring Requirements for the Eaton 150 kVA PDU (480V)

		Units	Rating 60 Hz				
Basic Unit Rating		kVA	50	75	100	125	150
Input/Output Voltage		Volts	480/208	480/208	480/208	480/208	480/208
AC Input to PDU (3) Phases, (1) Ground	**A**	Maximum Amps	61	92	122	153	184
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil [CSA – mm2] (each)	#4 [21] 1	#2 [34] 1	1/0 [54] 1	3/0 [85] 1	2/0 [67] 2
Minimum Conductor Size (Ground) Number per Phase	—	AWG or kcmil [CSA – mm2] (each)	#8 [8] 1	#6 [13] 1	#6 [13] 1	#6 [13] 1	#4 [21] 1
AC Output	—	Maximum Amps	139	208	278	347	416
AC Output from Subfeed Breakers to the Critical Load (3) Phases, (1) Neutral, (1) Ground	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings, power cable termination sizes listed in Table T, and national and local electrical codes. Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating. Wire 100% rated adjustable subfeed breakers for maximum rated current.					
AC Output from Distribution Panel Breakers to the Critical Load	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard). Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating.					

NOTE Callout letters **A** and **B** map to Figure A-19 or Figure A-19.

Table K. Input/Output Ratings and External Wiring Requirements for the Eaton 150 kVA PDU (600V)

		Units	Rating 60 Hz				
Basic Unit Rating		kVA	50	75	100	125	150
Input/Output Voltage		Volts	600/208	600/208	600/208	600/208	600/208
AC Input to PDU (3) Phases, (1) Ground	**A**	Maximum Amps	49	74	98	122	147
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil [CSA – mm2] (each)	#6 [13] 1	#3 [27] 1	#1 [43] 1	1/0 [54] 1	3/0 [85] 1
Minimum Conductor Size (Ground) Number per Phase	—	AWG or kcmil [CSA – mm2] (each)	#8 [8] 1	#8 [8] 1	#6 [13] 1	#6 [13] 1	#6 [13] 1
AC Output	—	Maximum Amps	139	208	278	347	416
AC Output from Subfeed Breakers to the Critical Load (3) Phases, (1) Neutral, (1) Ground	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings, power cable termination sizes listed in Table T, and national and local electrical codes. Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating. Wire 100% rated adjustable subfeed breakers for maximum rated current.					
AC Output from Distribution Panel Breakers to the Critical Load	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard). Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating.					

NOTE Callout letters **A** and **B** map to Figure A-19 or Figure A-19.

Table O. Eaton 150 kVA PDU Input Power Cable Terminations (415V)

Terminal Function	Rating (kVA)	Main Breaker Rating	Terminal	Function	Number and Size of Pressure Termination	Tightening Torque Nm (lb in)	Type and Size Screw
AC Input to Main Breaker CB1 (and CB2, if installed)	50	90A	A (Black)	Phase A	1 – #14 – 1/0	#14–10: 4 (35) #8: 4.5 (40 #6–#4: 5.1 (45) #3–1/0: 5/6 (50)	Slotted
			B (Red)	Phase B	1 – #14 – 1/0		Slotted
			C (Blue)	Phase C	1 – #14 – 1/0		Slotted
	75	150A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	100	200A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	125	250A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	150	300A	A (Black)	Phase A	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			B (Red)	Phase B	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			C (Blue	Phase C	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
Customer Ground	All	All	G (Green)	Ground	2 – #14 – 1/0	5.6 (50)	5/16” Hex

Table P. Eaton 150 kVA PDU Input Power Cable Terminations (480V)

Terminal Function	Rating (kVA)	Main Breaker Rating	Terminal	Function	Number and Size of Pressure Termination	Tightening Torque Nm (lb in)	Type and Size Screw
AC Input to Main Breaker CB1 (and CB2, if installed)	50	80A	A (Black)	Phase A	1 – #14–1/0	#14–10: 4 (35) #8: 4.5 (40 #6–#4: 5.1 (45) #3–1/0: 5/6 (50)	Slotted
			B (Red)	Phase B	1 – #14–1/0		Slotted
			C (Blue)	Phase C	1 – #14–1/0		Slotted
	75	125A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	100	150A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	125	200A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	150	225A	A (Black)	Phase A	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			B (Red)	Phase B	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			C (Blue	Phase C	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
Customer Ground	All	All	G (Green)	Ground	2 – #14–1/0	5.6 (50)	5/16” Hex

Table S. Recommended (or Equivalent) Installation Parts and Tools (Not Supplied by Eaton)

Part	Size	Quantity	Manufacturer	Part Number	Notes
Long Barrel 2-Hole Lug	#8 AWG	As required	Thomas & Betts	54850BE	Copper wire only
	#6 AWG		Thomas & Betts	54852BE	
	#4 AWG		Thomas & Betts	54854BE	
	#3 and #2 AWG		Thomas & Betts	54856BE	
	#1 AWG		Thomas & Betts	54858BE	
	1/0 AWG		Thomas & Betts	54860BE	
	2/0 AWG		Thomas & Betts	54862BE	
	3/0 AWG		Thomas & Betts	54864BE	
	4/0 AWG		Thomas & Betts	54866BE	
	250 MCM		Thomas & Betts	54868BE	
	300 MCM		Thomas & Betts	54870BE	
	350 MCM		Thomas & Betts	54872BE	
	400 MCM		Thomas & Betts	54874BE	
	500 MCM		Thomas & Betts	54876BE	
Manual Hydraulic Crimp Tool	14 Ton	1	Thomas & Betts	TBM14M	
Die Set	N/A	1	Thomas & Betts	15506	
NOTE Equivalent parts are acceptable.					

20. Terminals are UL and CSA rated at 75°C. See Table T for output power cable terminations. Paragraph A.5 shows the location of output power cable terminals inside of the PDU cabinet.

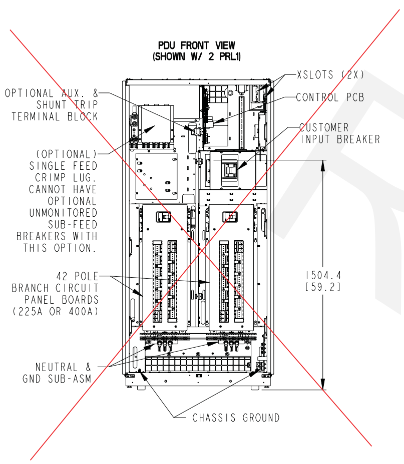
21. DO NOT overtighten the terminal lugs to prevent stripping the threads. Tighten lugs to the torque values in Table T.

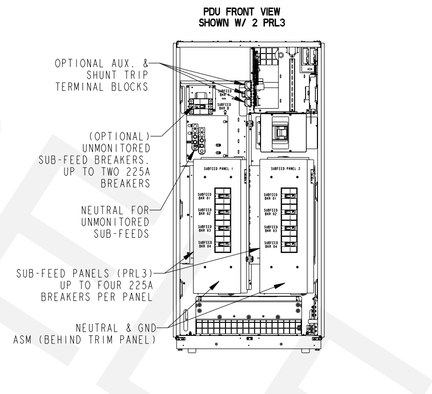
Table T. Eaton 150 kVA PDU Output Power Cable Terminations

Terminal Function	Breaker Rating	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type and Size Screw
AC Output from Subfeed Breakers to Critical Load	("F" Frame)	A	Phase A	1 – 4/0	31 (275)	5/16" Hex
		B	Phase B	1 – 4/0	31 (275)	5/16" Hex
		C	Phase C	1 – 4/0	31 (275)	5/16" Hex
		N	Neutral	1 – 4/0	31 (275)	5/16" Hex
		G	Ground	84 – #4–#14 or 2 x #12–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)	Slotted
	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions and national and local electrical codes (output is prewired to the panelboard).					
AC Output from Distribution Panel Breakers to Critical Load	N/A	N	Neutral	84 – #4–#14 or 2 x #12–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)	Slotted
	N/A	G	Ground	84 – #4–#14 or 2 x #12–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)	Slotted

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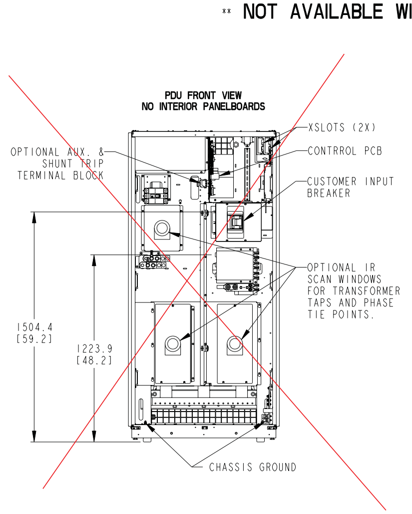
50-150KVA STANDARD SERVICE ACCESS

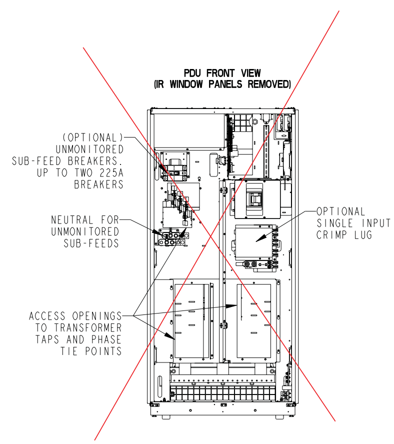


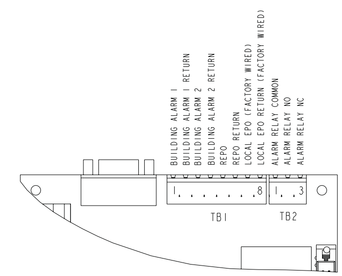


50-150KVA FRONT SERVICE ACCESS

** NOT AVAILABLE WITHOUT SIDECAR DISTRIBUTION **

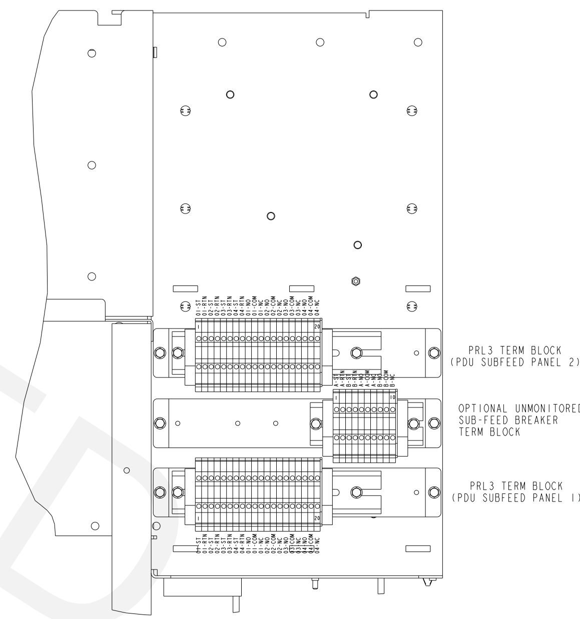






CONTROL PCB

SCALE 1/1



(OPTIONAL) AUX & SHUNT TRIP TERMINAL BLOCKS

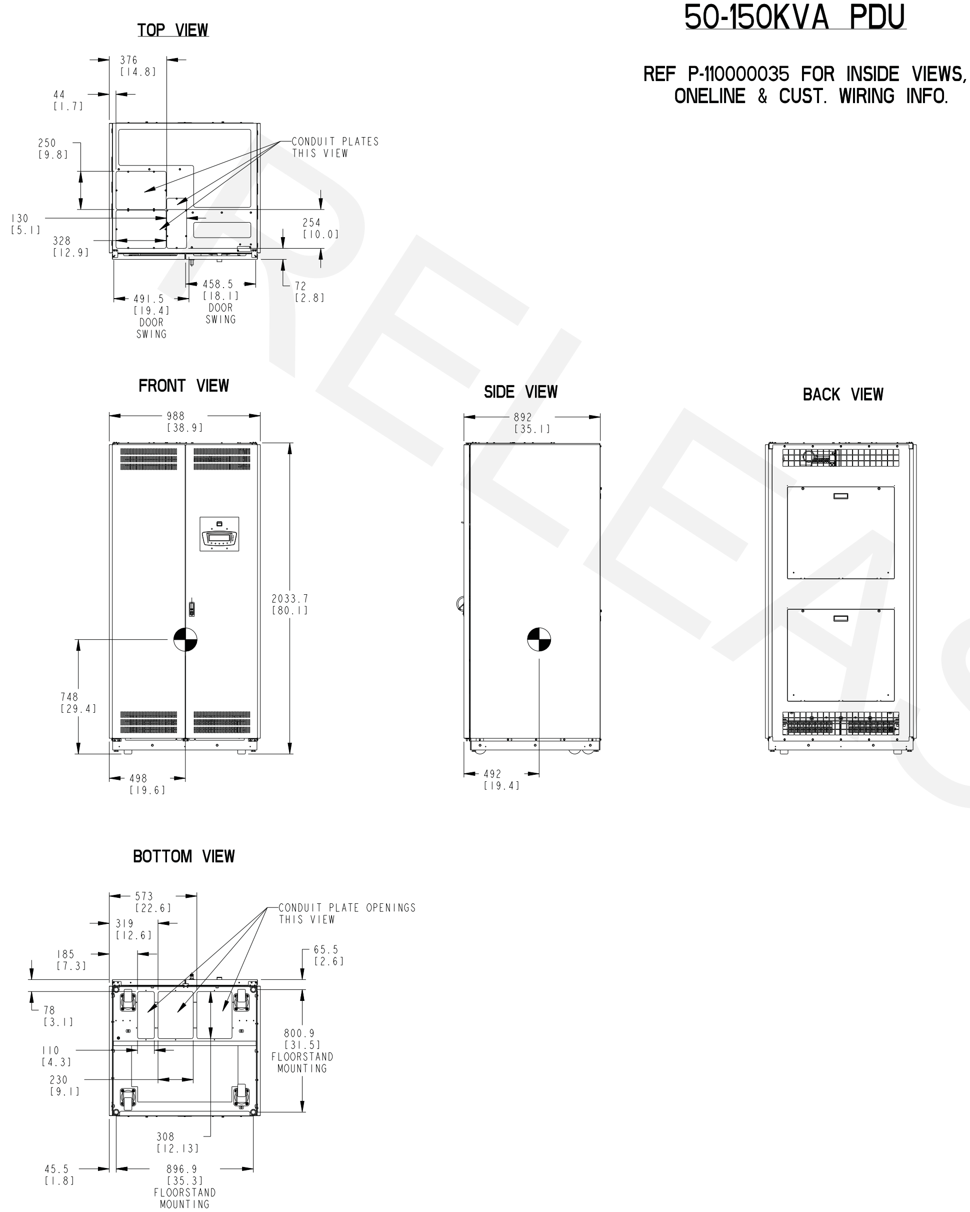
SCALE 1/2

REF PROE MODELS
P-110000036_FRT-SVC.ASM
P-110000036_STD-SVC.ASM
P-110000037_FRT-SVC.ASM
P-110000037_STD-SVC.ASM

METRIC	THIRD ANGLE PROJECTION	EATON CORPORATION, ELECTRICAL	EATON	SIZE: D
DESCRIPTION: SITE PLAN INFORMATION, 50-300KVA PDU AND SIDECAR				
MODIFIED BY: T. Wallace	DATE: 15-Aug-2011	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE: ANGLES: ±1/2° HOLES: Ø±0.13 DECIMALS: 0.X: ±0.75 0.XX: ±0.25 X. (FOR X < 3): ±1 X. (FOR X > 3): ±2.5 DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING		SCALE: 1/16 DO NOT SCALE DRAWING OR CHANGE MANUALLY
ECO: ECO-024495	STATE: Release			
PRO-ENGINEER GENERATED		PART NAME: P-110000035	REVISION: 001	SHEET: 1 OF 5

50-150KVA PDU

REF P-110000035 FOR INSIDE VIEWS, ONELINE & CUST. WIRING INFO.

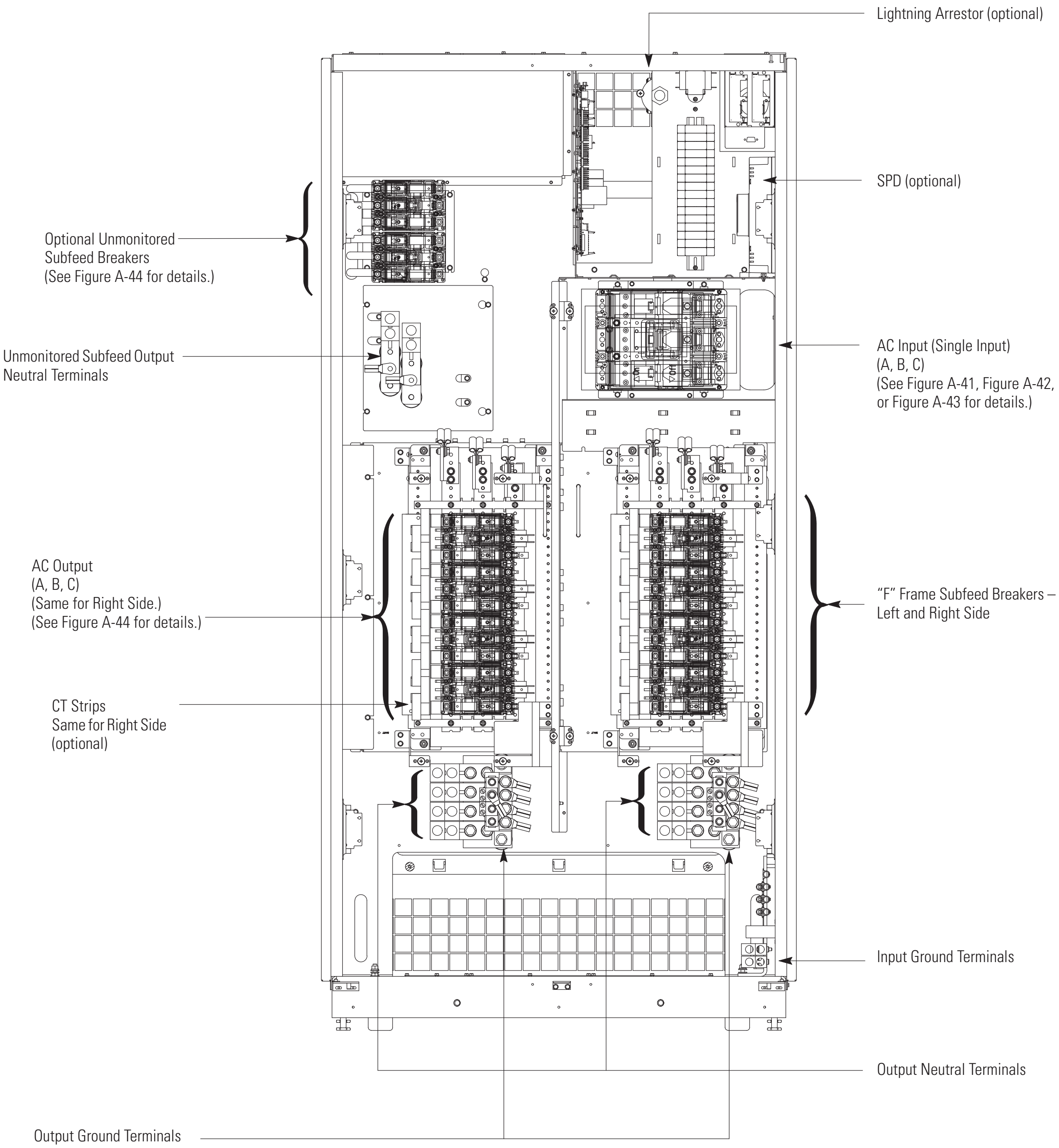


NOTES:

1. WEIGHT (150KVA TRANSFORMER AND 2 PRL1 400A PANEL BOARDS):
   STANDARD SERVICE ACCESS UNIT - 1262 KG (2782 LBS)
   * FRONT SERVICE ACCESS ONLY - 1170 KG (2580 LBS)
   *FRONT SERVICE ACCESS ONLY UNITS DO NOT HAVE INTERNAL PANEL BOARDS.
   * FRONT SERVICE ACCESS ONLY UNITS NOT AVAILABLE WITHOUT SIDECAR DISTRIBUTION.
   DIFFERENT CONFIGURATIONS MAY HAVE DIFFERENT WEIGHTS.
2. THE SYSTEM MUST BE INSTALLED ON A LEVEL FLOOR SUITABLE FOR COMPUTER OR ELECTRONIC EQUIPMENT.
3. THE SYSTEM MUST BE INSTALLED IN A TEMPERATURE AND HUMIDITY CONTROLLED INDOOR AREA FREE OF CONDUCTIVE CONTAMINANTS.
4. AMBIENT TEMPERATURE RANGE: 0-40C (32-104F);
   RECOMMENDED OPERATING RANGE: 20-25C (68-77F);
   MAXIMUM RELATIVE HUMIDITY: 95% NON-CONDENSING.
5. MINIMUM 457.2mm (18"). CLEARANCE IN FRONT AND MINIMUM 101.6mm (4") IN REAR OF THE CABINET ARE REQUIRED FOR COOLING AIR INTAKE.
   REAR SERVICING SPACE FOR STANDARD SERVICE ACCESS UNITS IS 609.6mm (24").
6. TOP AND BOTTOM CABLE ENTRIES THROUGH REMOVABLE ACCESS PLATES ARE STANDARD FOR ALL CONFIGURATIONS. ACCESS PLATES SHALL BE CUSTOM MODIFIED TO SUIT CONDUIT SIZES.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRIC CODES.
8. CENTER OF GRAVITY LOCATION SHOWN FOR PDU ONLY.
9. SPECIFICATIONS ARE SUBJECT TO CHANGE.

REF PROE MODEL
P-110000036_FRT-SVC.ASM

METRIC	THIRD ANGLE PROJECTION	EATON CORPORATION, ELECTRICAL	EATON	SIZE: D
DESCRIPTION: SITE PLAN, 50-150KVA STD & FRT SERVICE ACCESS PDU				
MODIFIED BY: T. Wallace	DATE: 9-Aug-2011	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE: ANGLES: ±1/2° DECIMALS: 0,X: ±0,75 X, (FOR X < 3): ±1 HOLES: Ø±0,13 0,XX: ±0,25 X, (FOR X > 3): ±2,5 DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING		SCALE: 1/16 DO NOT SCALE DRAWING OR CHANGE MANUALLY
ECO: ECO-023641	STATE: Release			
PRO-ENGINEER GENERATED	PART NAME: P-110000036-001	REVISION: 001		SHEET: 1 OF 1



NOTE The PDU is shown with eight subfeed breakers. However, the installed configuration may contain one to eight subfeed breakers.

Figure A-29. Power Terminal Locations – PDU with Left and Right "F" Frame Subfeed Breakers

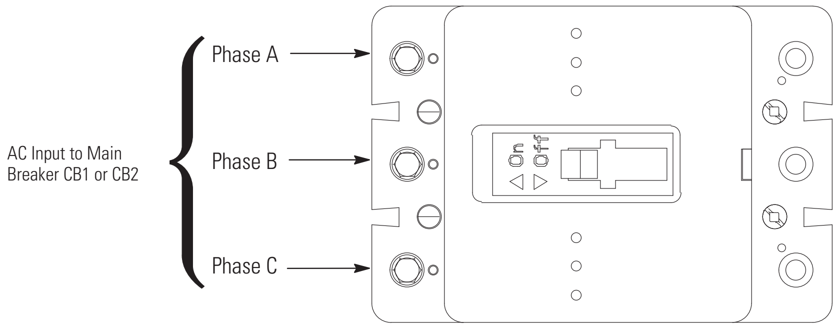


Figure A-41. Power Terminal Locations – "F" Frame PDU Input Main Breaker CB1 or CB2 Terminal Detail

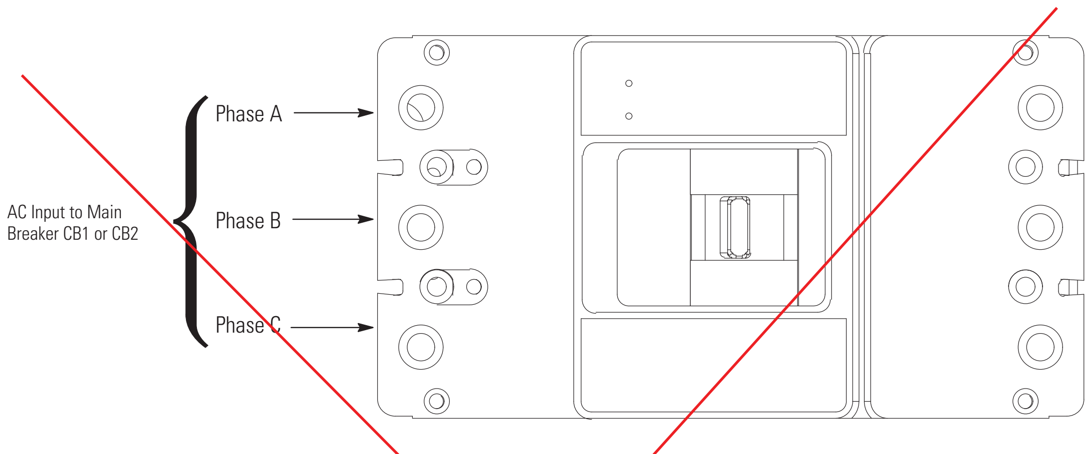


Figure A-42. Power Terminal Locations – "K" Frame PDU Input Main Breaker CB1 or CB2 Terminal Detail

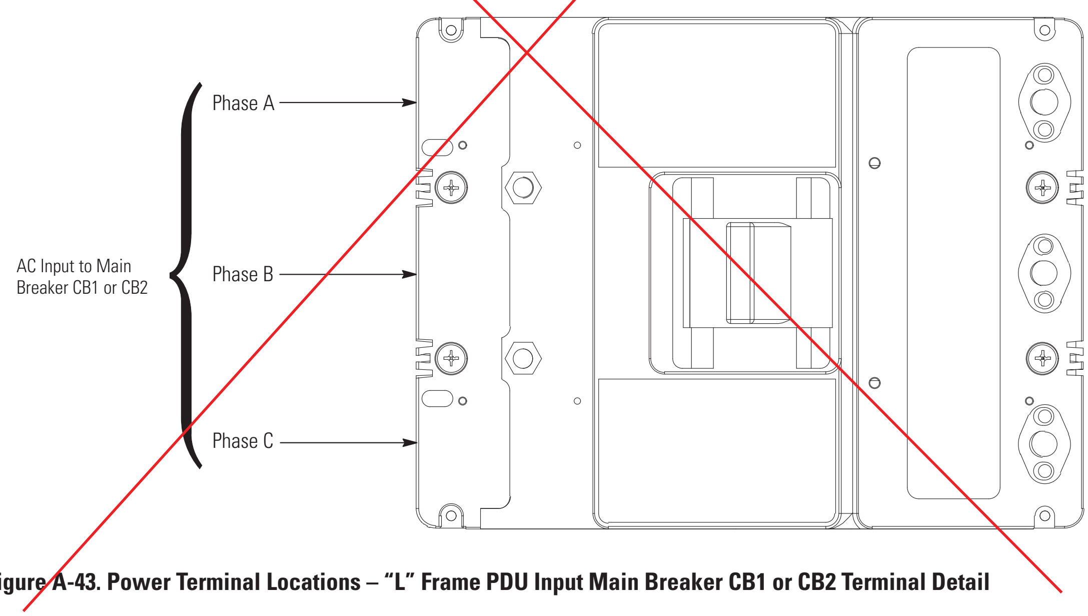


Figure A-43. Power Terminal Locations – "L" Frame PDU Input Main Breaker CB1 or CB2 Terminal Detail

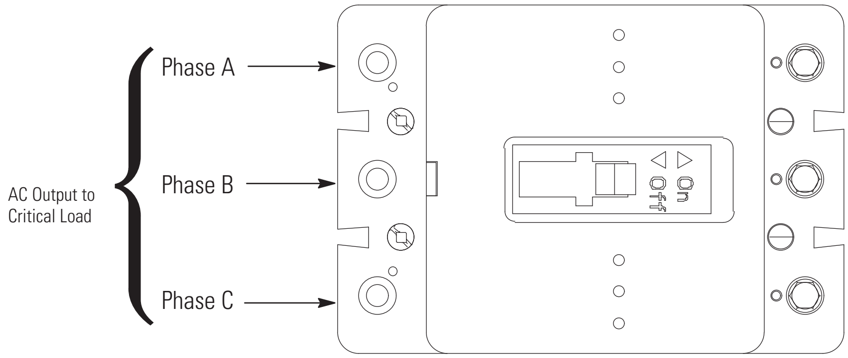


Figure A-44. Power Terminal Locations – "F" Frame Output Subfeed Breaker Terminal Detail

A.6 Interface Wiring Notes

Control wiring for features and options should be connected at the customer interface terminal blocks located inside the PDU.

WARNING

Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.

WARNING

Alarm relay contacts should not be operated in excess of 30 Vac @ 5A maximum.

1. Use Class 1 wiring methods (as defined by the NEC) for interface wiring up to 30V. The wire should be rated at 24V, 1A minimum.
2. Use Class 2 wiring methods (as defined by the NEC) for interface wiring from 30 to 600V. The wire should be rated at 600 volts, 1A minimum and 12 AWG maximum.
3. Use twisted-pair wires for each input and return or common.
4. All interface wiring and conduit is to be provided by the customer.
5. When installing external interface wiring (for example, building alarm, relay output, and X-Slot) to the PDU interface terminals, conduit must be installed between each device and the PDU cabinet.
6. Install the interface wiring in separate conduit from the power wiring.
7. All building alarm inputs require an isolated normally-open or normally-closed contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts. All relay and switch contacts are customer-supplied.
8. The building alarms can be programmed to display the alarm functional name using the front panel LCD.
9. Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac and 28 Vdc.
10. Alarm relay wiring should be a minimum of 22 AWG.
11. See Table U, Figure A-45 through Figure A-55, and Chapters 3 and 7 for interface wiring.
12. LAN drops for use with X-Slot connectivity cards must be provided by facility planners or the customer.

Table U. UCB TB1 and TB2 Interface Connections

TB1 Terminal	Name	Description
1	Building Alarm 1	Input: Programmable PDU alarm, activated by a remote dry contact closure. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts.
2	Building Alarm 1 Return	
3	Building Alarm 2	Input: Programmable PDU alarm, activated by a remote dry contact closure. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts.
4	Building Alarm 2 Return	
5	REPO	Input: normally-open or normally-closed dry contact used to activate PDU EPO from a remote switch. The factory default configuration is set up for use with a normally-open switch. To use a normally-closed switch, the configuration must be changed during setup by an Eaton Customer Service Engineer.
6	REPO Return	
7	Local EPO	Input: Dry contact to activate PDU EPO of from factory wired local cabinet-mounted EPO switch.
8	Local EPO Return	
TB2 Terminal	**Name**	**Description**
1	Alarm Relay Common	Output: General purpose normally-open (NO) and normally-closed (NC) relay contacts. Set by default to signal when a panelboard or subfeed breaker overload occurs.
2	Alarm Relay NO	
3	Alarm Relay NC	

NOTE "Return" indicates connection to electronics circuit ground. "Common" indicates connection to common side of isolated relay contact.

Table V. PDU Aux & Shunt Trip Wiring Terminal Block Terminations

Terminal Function	Rating	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type Screw	Comment
Shunt Trip or Auxiliary Contacts	600V, 20A	#26–#12	0.4 (3.5) - 0.8 (7.1)	Slotted	Use twisted-pair wires for each input and return or common. Strip wire insulation back 10 millimeters to wire terminal blocks.

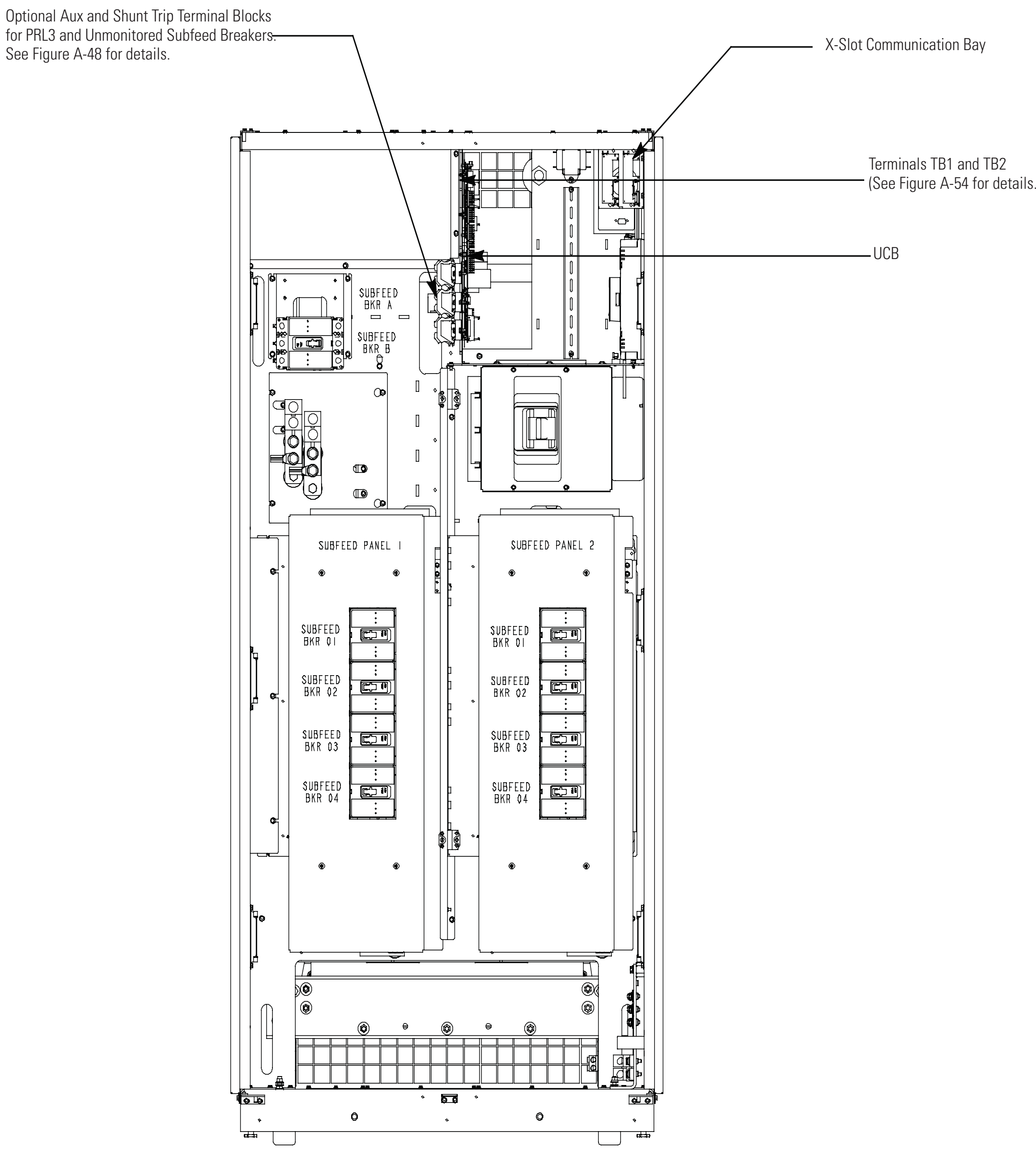
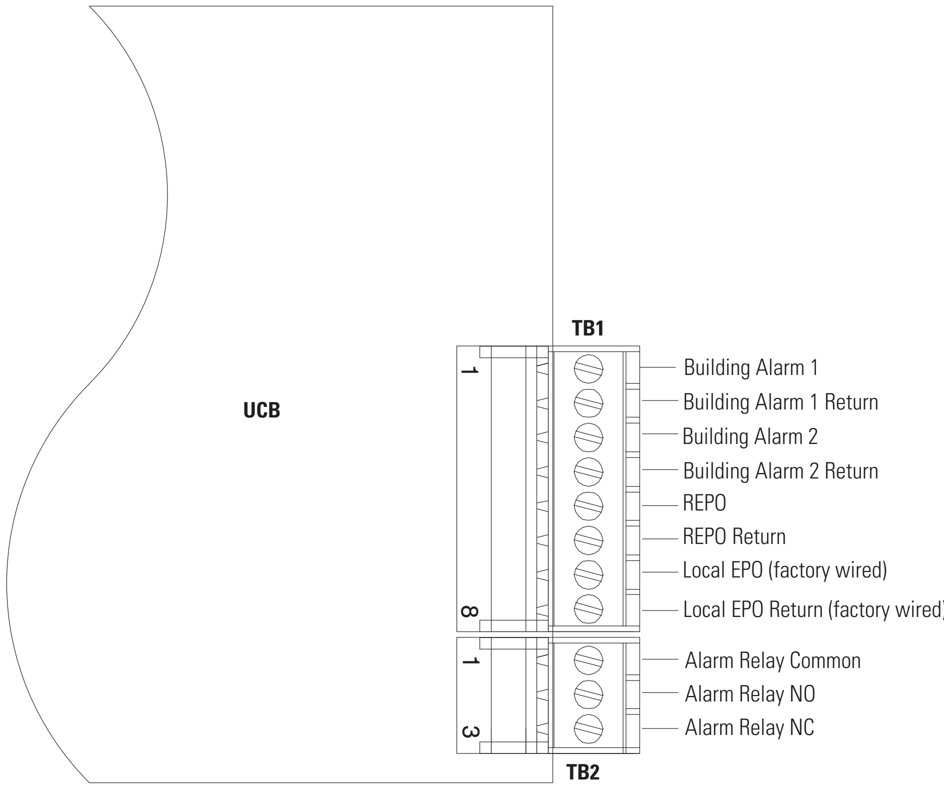


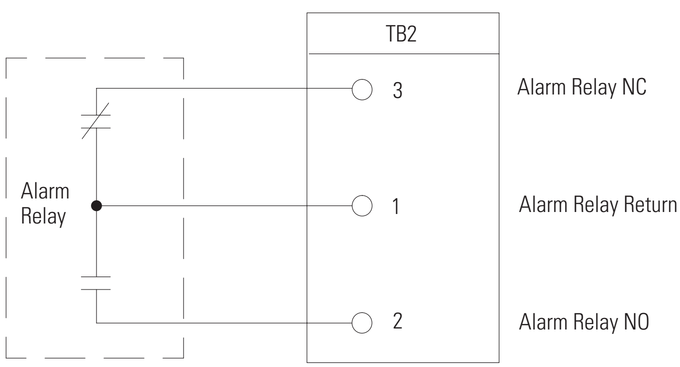
Figure A-46. PDU Interface Terminal Locations for Two PRL3 and Subfeed Breaker Monitoring



NOTE All building alarm inputs require an isolated normally-open or normally-closed contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal as shown. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts. All control wiring and relay and switch contacts are customer-supplied.

NOTE The building alarms can be programmed to display the alarm functional name using the front panel LCD controls.

Figure A-54. PDU Interface Terminal Detail



NOTE Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac and 28 Vdc.

NOTE Alarm relay wiring should be a minimum of 22 AWG.

NOTE Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.

NOTE Relay is shown in de-energized state. By default, the relay changes state when a panelboard or subfeed breaker overload occurs.

Figure A-55. Typical Alarm Relay Connection

A.10 Optional Air Skirt

An air skirt can be installed around the perimeter of the PDU Main Unit and any sidecars installed with the PDU. An air skirt helps contain air flow under the PDU. See Figure A-63 through Figure A-68 for air skirt installation illustrations.

CAUTION

Use air skirts only when the PDU is installed on a raised floor where the raised floor acts as a plenum and provides adequate air flow to the PDU. The side skirts are to keep forced air from escaping, but will block air if installed on a concrete or similar non-raised flat floor. Inadequate air flow will cause the PDU to overheat

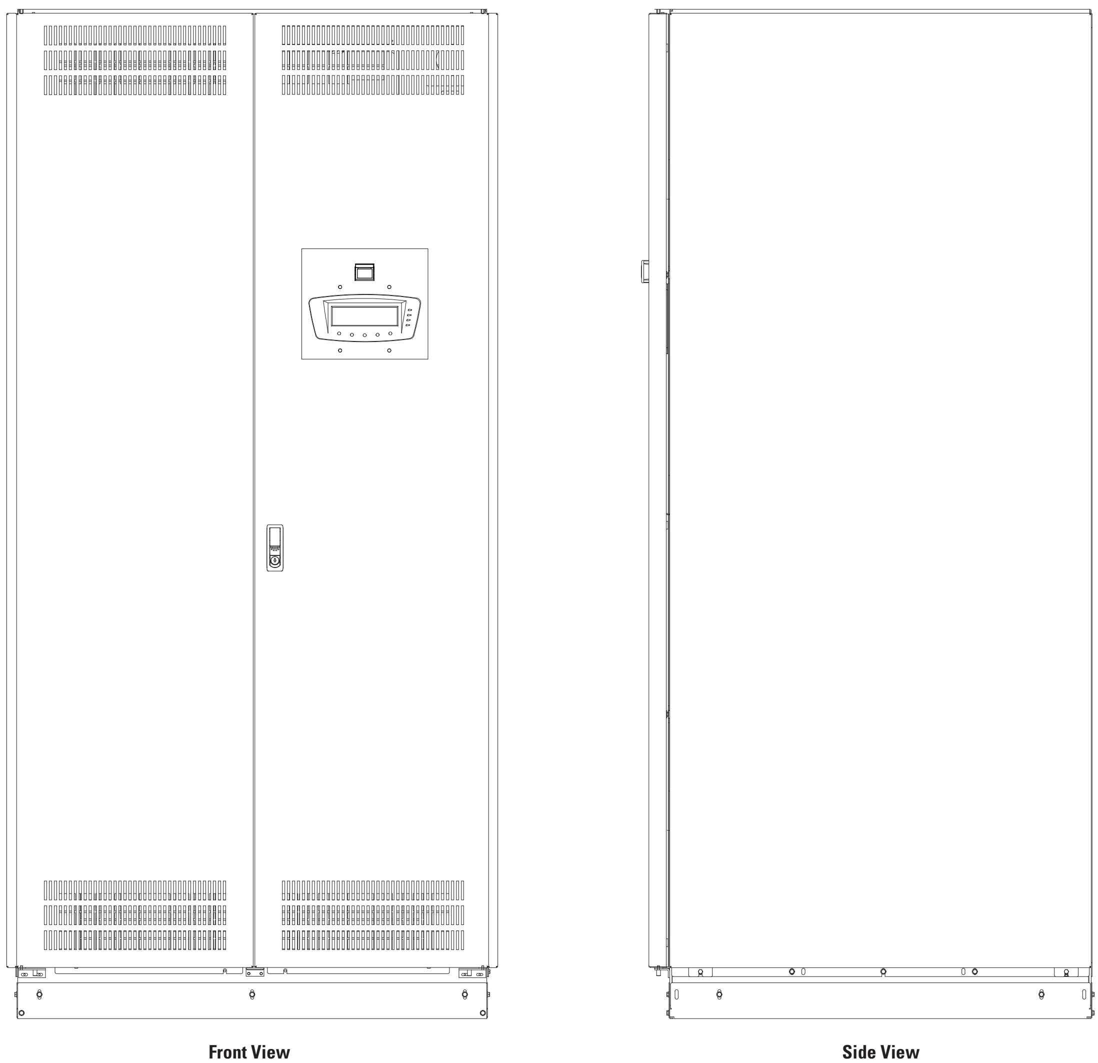


Figure A-63. 150 kVA PDU Main Unit with Optional Air Skirt Installed (Front and Side View)

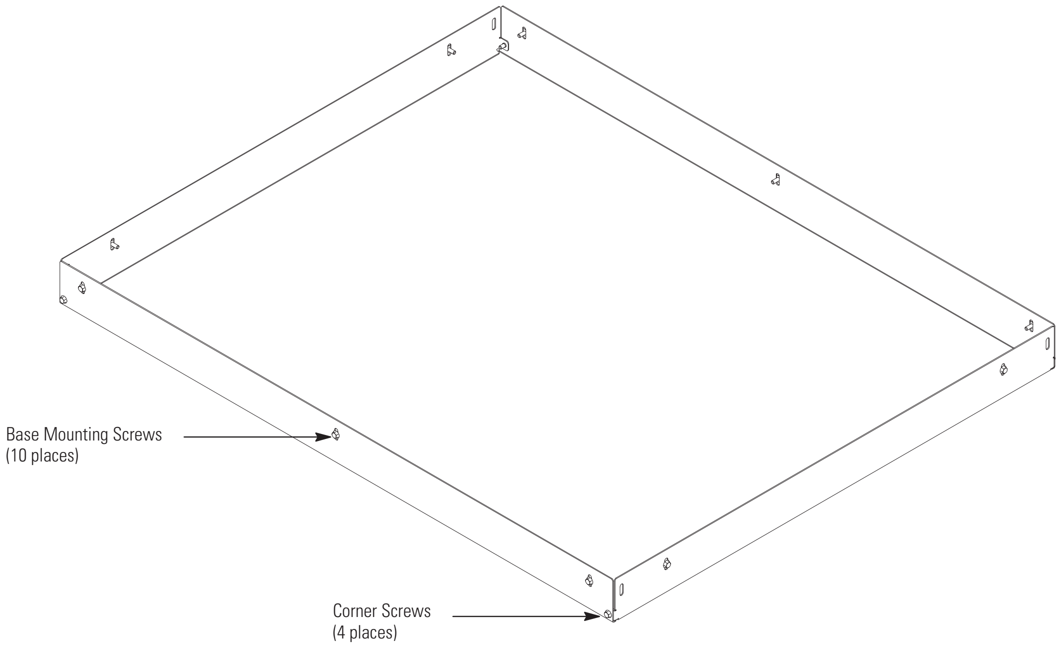


Figure A-66. Air Skirt Footprint for 150 kVA PDU

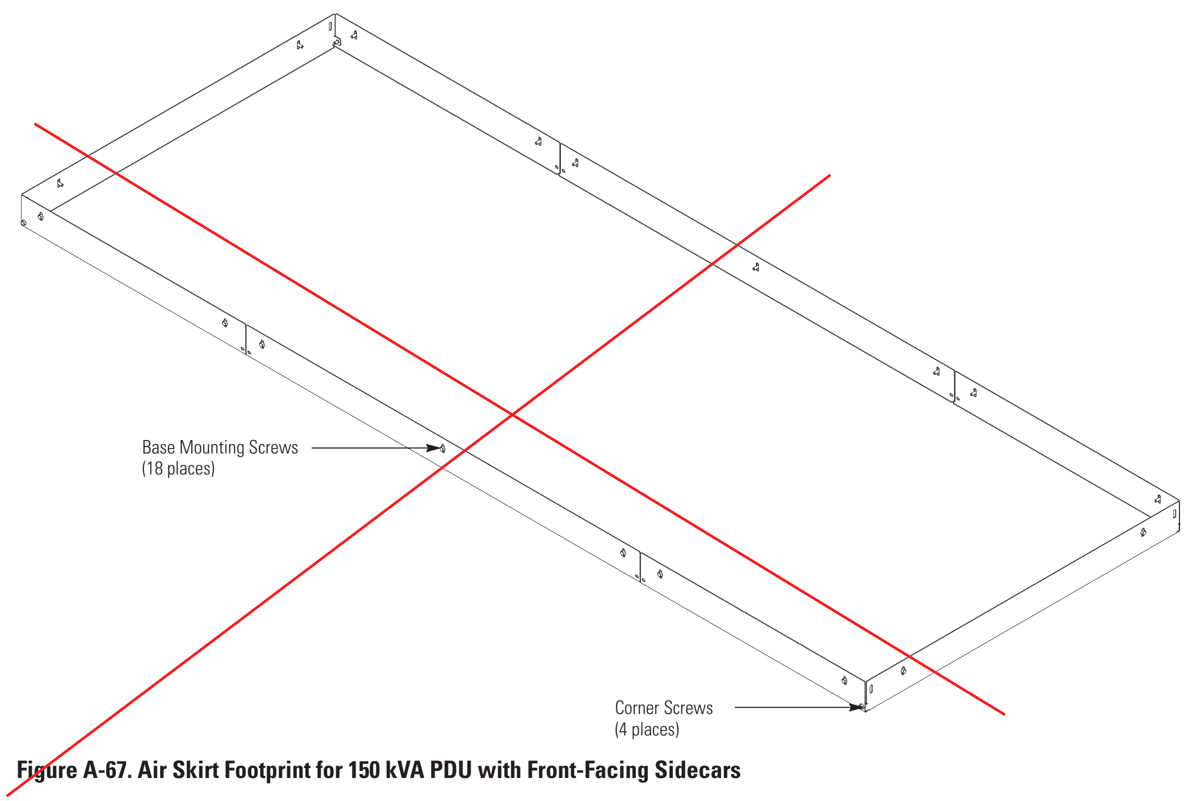


Figure A-67. Air Skirt Footprint for 150 kVA PDU with Front-Facing Sidecars

Eaton Energy Management System





Optimize power utilization and availability at all levels including branch circuits in the Eaton PDU and RPP.

Features

- Continuously monitors power conditions at branch circuit, sub-feed and main breaker levels
- Issues warnings and alarms if current loads or environmental conditions exceed user-defined thresholds
- Tracks event history, with integrated, real-time clock for time stamping
- Collects data from up to eight panelboards and 336 pole positions in a single system
- Makes all data available on a state-of-the-art local display
- Sends data to remote displays or management systems, using optional interface card
- Stores 23 months of data for diagnostics, comprehensive load profiling and energy planning
- Supports power distribution equipment from Eaton and other manufacturers

The power demands of data centers are exponentially larger and more variable than ever before, creating a real management challenge. How can you utilize the power distribution system to its fullest potential, without compromising reliability?

The answers have been elusive under changing conditions. Power consumption can easily double or triple during peak periods, and it fluctuates with every move, add or change. Adding a 1U or 2U server used to mean drawing 300 to 500 more watts from the branch circuit; now, a new blade server consumes 10 times as much current. Even a prominent Internet service provider suffered unplanned downtime in its multi-million-dollar data center because branch breakers kept nuisance tripping.

Demand is up, and so is the imperative for business continuity…so you protect electrical systems with uninterruptible power systems (UPSs), battery backup, generators and system-wide monitoring. Millions of dollars a year are invested in such measures, yet there might still be a proverbial weakest link at the local level: the branch circuit that serves critical equipment.

At this level, you might not be able to see trouble coming until a circuit breaker trips, and that's too late. Systems go down, valuable data is lost and business comes to a standstill. It can take hours to recover.

Some organizations address this concern by periodically checking current loads with handheld meters. Unfortunately, this occasional sampling can easily miss problem conditions, which can appear and disappear in microseconds. Besides, it is expensive to buy or manage permanently installed meters on every branch circuit. Facility managers need a better way to ensure reliable, continuous power at the branch circuit and system level.

Continuous measurement and reporting of branch circuits, sub-feed and main breaker activity, with proactive alarms

The Eaton Energy Management System continuously measures the current on all breaker levels and warns you of impending trouble, so you can take proactive action. Armed with these insights, data center and facilities managers can more effectively manage energy consumption to prevent overload conditions, optimize power distribution, and, when applicable, allocate energy costs among internal departments.

Powering Business Worldwide

The architecture of the monitoring system is straightforward, which makes it stable and reliable. Branch circuit wires are threaded through current transducers (CTs), which sense the current level going through the wire and send the information to a universal controller. CTs are also used for sub-feed and main breakers. The controller assimilates the information from CTs at multiple panelboards and then relays it to a local display or remote management system for analysis and reporting. The CTs are exceptionally robust and have a very long life expectancy.

A single system can expand up to six 42-circuit panelboards (up to 252 pole positions or 20 three-pole sub-feeds depending on PDU configuration), in addition to monitoring the main input/output parameters of the distribution equipment, such as a power distribution unit (PDU) or remote power panel (RPP).

Detailed insights into circuit-level power conditions

The Energy Management System assesses circuit activity 24/7 and provides time-stamped metering along with alarm and statistical information for each branch circuit. You get the significant information necessary to effectively manage the edge of the power distribution system.

For example, you can see minimum and maximum current, power, and frequency; power quality metrics such as total harmonic distortion and power factor; time-stamped event records; and more. This information is shown for individual circuits and summarized for each panelboard and at the equipment level, such as PDU or RPP. You get visibility at all levels within one unit.

Early warning of problem conditions

When current on a branch circuit or main circuit breaker reaches a user-defined threshold, the system sends a warning alarm to the local display and the defined communications network, identifying the specific circuit and the condition. The data center or facility manager is alerted, with time-stamped information, before the current approaches the breaker's trip point.

Local and remote access to power monitoring data

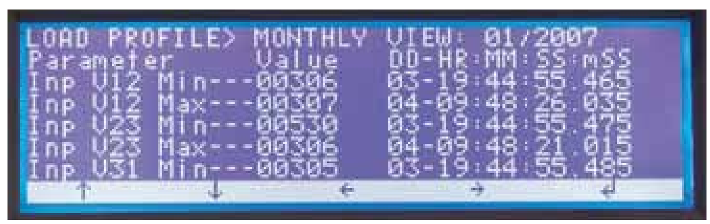
Most other monitoring systems on the market require you to purchase a separate display if you want to view circuit activity and alarms locally or can't review an entire system in a single display.

With this system, a state-of-the-art multi-line LCD local display is included in the base system package. Technicians always have an up-to-the-minute view of power conditions right at the equipment.

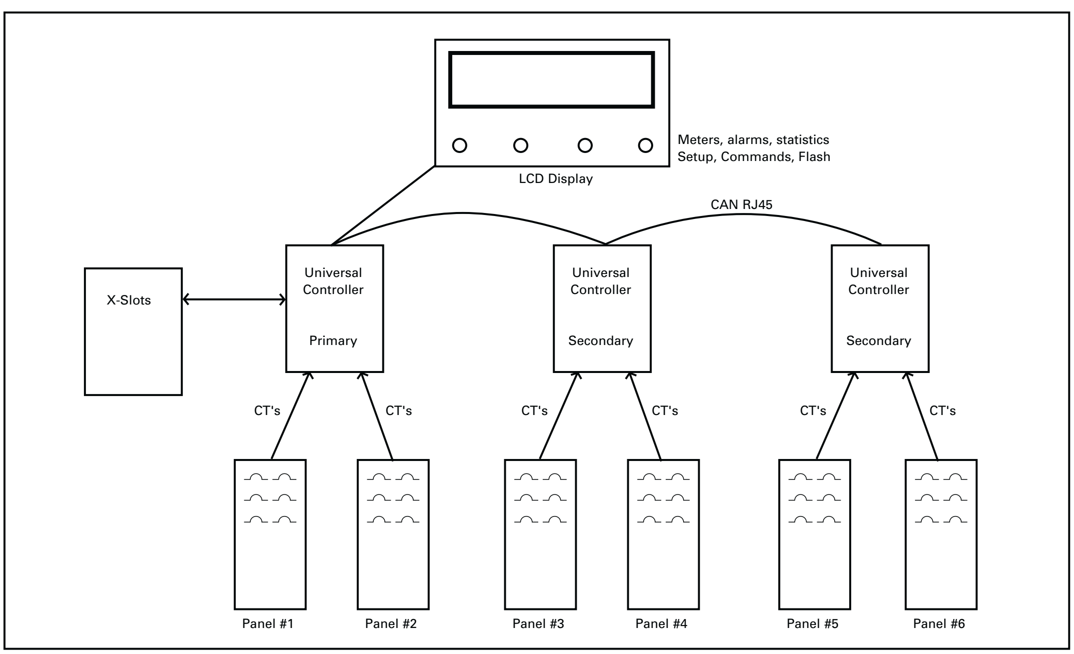
With an optional Power Xpert Gateway 1000 interface card the universal controller sends data to your building management system or power management system (such as Eaton PowerVision® or FORESEER® systems) using industry-standard Modbus and Web/SNMP protocols.

Monitoring of environmental conditions

In addition to readings of electrical activity, the Energy Management System monitors key environmental conditions, such as temperature and humidity of the distribution equipment. For a PDU, the system can measure the temperature of the unit's transformer. These capabilities enable data center managers to identify trouble conditions and then design layouts that avoid undesirable hot spots.



Load profile with date/time stamp



The Eaton Energy Management System sends data from up to six panelboards, up to 252 pole positions, to a single display— and sends warning alarms if conditions could potentially trip any branch or main circuit breaker.

A unique, differentiating feature of the Energy Management System is its ability to archive data and perform load profiling across many months. The information captured from each branch circuit and the main incoming/outgoing circuits is stored on the local PDU control board. An on-board, real-time clock accurately time-stamps all events. All the information can be sent over the LAN to your building management system.

Users can view data for the previous 23 months to gain valuable insight for managing power consumption and diagnosing issues. With this innovative feature, you can assess long-term load trends and optimize utilization of available power at all levels—capabilities that will help extend the useful life of existing infrastructure and delay the need for new investments.

Easy installation in new or retrofit applications

The Energy Management System is designed to complement and effectively work within a broad array of data center and facilities applications. It can be used in a variety of products, such as PDUs, remote power panels and rack-based distribution systems, as well as third-party power distribution equipment. Packaged kits are available for use with any manufacturer's panelboards and breakers. Retrofitting is a simple process, given that the current sensors don't require any calibration in the field, even if the configuration of branch circuits isn't known.

A complete solution

Branch circuit monitoring technology has been field-proven for years, and recent advances in technology and design have made the solution more affordable than ever. It definitely provides cost-effective insurance against tripped circuits and unplanned shutdowns.

When comparing features and technical specifications of different systems, you'll quickly see that the Eaton Energy Management System provides more all-in-one functionality than other vendors' offerings. It has the broadest list of measured and reported critical parameters in the market.

Features such as local display, the ability to shunt trip main breakers, and sub-feed monitoring and coverage for 252 circuits in a single display —which are add-on options or unavailable with other systems—are standard on ours.

Find out more about how the Eaton Energy Management System can add an essential extra layer of reliability to the management of your electrical distribution system. Contact us at **1.800.356.5794** or visit us on the Web at **www.eaton.com/powerquality.**

Sub-feed monitoring



Load profiling; minimum/maximum current and voltage



Per phase percent current. power, power factor



Per phase voltage and current

Branch circuit monitoring



Power consumption information



Alarm thresholds



Branch circuit current



Panel board breaker schedule

Technical Specifications

General
UL and cUL listed
Up to 252 branch circuits monitored on a single display

Input Monitoring
Three-phase voltage: RMS L-L, RMS L-N, RMS %, THD % and frequency
Three-phase current: RMS, RMS %, THD %, Crest Factor
Power: kW, kVA, PF (when input CT option is installed)
Monthly profiling: Time-stamped Min V, Max V, Min I, Max I, Max THD, Min kVA, Max kVA, Power Factor
Active alarms and event logging: Input ACUV, Input ACOV, Input UFOF, Input Phase Rotation, Input Phase Loss, THD

Output Monitoring
Three-phase voltage: RMS L-L, RMS L-N, RMS %, THD % and Frequency
Three-phase current: RMS, RMS %, THD %, Crest Factor
Power metering (kW, kVA, PF)
Power usage (kWH): Monthly, Yearly, Total, Non-volatile
Monthly profiling: Time-stamped Min V, Max V, Min I, Max I, Max THD, Min kVA, Max kVA
Active alarms and event logging: Output ACUV, Output ACOV, Output UFOF, Output Phase Rotation, Three Level Phase Overload, THD, phase loss

System Monitoring
Non-volatile real-time clock
Ground current: RMS
Neutral current: RMS
Monthly profiling: Time-stamped, minimum and maximum ground and neutral current
Active alarms and event logging: ground/neutral current warning, ground current overload, neutral current warning, neutral current overload, transformer over-temperature warning, transformer over-temperature, SPD failure, input breaker open, input breaker tripped, Emergency Power Off, building alarm 1 to 4 (Alarm names for building alarms are programmable by user)

Controls (Optional)
Emergency Power Off
Remote Emergency Power Off
Manual restart
Phase loss protection
Ground fault detection

Due to continuing product improvements specifications are subject to change and new features may be available. Contact your Eaton representative for details.

Environmental parameters (used with EMP and PXGX 1000 card)
Unit temperature calculated in metric or standard (°F and °C)
Optional Transformer (if applicable) temperature (°F and °C)
Optional Humidity within the unit (%)

Individual panel or sub-feed breaker monitoring (42 positions each Panel)
One-, two- or three-phase current: RMS, RMS%
Power: kW, kVA, PF
Power usage (kWH): monthly, yearly, total
Max current/phase, Wmax, VAmax, PFmin, Active alarms and event logging: panel breaker overload warning, panel breaker overload
User can easily add panel breakers
User configurations: breaker rating, number of phases, position, breaker overload alarms, breaker overload warning level

User interfaces
Eight-line by 40-charater LCD local display
Four indicator lamps and alarm horn
Optional emergency power-off switch

Communications
Two serial ports, one shared RS232/X-Slot plus one X-Slot for communication expansion
Standard output alarm relay
Optional X-Slot modbus RTU card
Optional X-Slot PXGX 1000 card

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Raleigh, NC 27615 U.S.A.
Toll Free: 1.800.356.5794

www.eaton.com/powerquality

CANADA
Ontario: 416.798.0112
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South Cone: 54.11.4124.4000
Brazil: 55.11.3616.8500
Andean & Caribbean: 1.949.452.9610
Mexico & Central America: 52.55.9000.5252

EUROPE/MIDDLE EAST/AFRICA
Denmark: 45.3686.7910
Finland: 358.94.52.661
France: 33.1.6012.7400
Germany: 49.0.7841.604.0
Italy: 39.02.66.04.05.40
Norway: 47.23.03.65.50
Portugal: 55.11.3616.8500
Sweden: 46.8.598.940.00
United Kingdom: 44.1753.608.700

ASIA PACIFIC
Australia: 61.2.9693.9366
New Zealand: 64.0.3.343.3314
China: 86.21.6361.5599
HK/Korea/Taiwan: 852.2745.6682
India: 91.11.4223.2300
Singapore/SEA: 65.6825.1668

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EATON
Powering Business Worldwide

Power Xpert® Gateway PDP Card



Monitoring energy in a networked world

The Power Xpert Gateway PDP card (PXGX PDP) is the primary data acquisition solution for Eaton power distribution units (PDUs) remote power panels (RPPs), rack power modules (RPMs), power distribution racks (PDRs), and energy management system upgrade kits (EMSs). Data from the downstream devices are time stamped and stored in non-volatile memory. This interval data can be stored or uploaded to a destination of the user's choice through CSV files. Data can also be accessed through any Web browser directly on the PXGX PDP down to the individual breaker level. Users can view data in Power Xpert Software, BMS, NMS, building dash boards, custom software applications, or virtually any Web interface.

Delivers real-time, Web-enabled monitoring of Eaton® Power Distribution Units, Rack Power Modules and Remote Power Panels

Product snapshot

- Real-time power monitoring presented how you need it – via standard on-board Web pages, Power Xpert Software or 3rd party network or building management systems
- Ethernet switch port allowing for daisy chaining of Ethernet communicating products
- Allows easy and remote configuration and monitoring of the the Eaton Energy Management System (EMS)
- Supports the Eaton Environmental Monitoring Probe

Features and benefits

- **Monitor energy usage -** reveal opportunities and verify results of efficiency improvements
- **Remote Monitoring -** via the Web monitor real-time data and profile energy usage on your power distribution system
- **Web-enabled monitoring of power quality data down to the branch circuit level -** Data can be viewed from any location with a Web browser
- **Configure and edit the EMS remotely via the Web interface -** supports remote configuration including naming, alarm and warning set points, and percentages
- **Data, interval and event logging with time stamp -** Accurate logging for power quality analysis
- **Modbus TCP/IP and SNMP Support -** Open communication protocol facilitates integration with standard building management systems and network management systems
- **Customized email messaging for events notification, including data, interval and event logs and periodic "heartbeat" emails -** Direct alarm and event notification to the appropriate person(s) in the organization
- **Easy integration into existing Ethernet infrastructure -** Minimize installation cost

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Free Power Xpert Energy Viewer

This free software download works with the PXGX PDP to allow quick and easy views of energy usage and comparison data. Yes, the data is available via a CSV file, however this tool doesn't require a Microsoft® Excel® spreadsheet expert. Simply select the energy parameters you're interested in tracking, and click! It automatically displays energy usage summary information in both tabular and graphical format. You can even compare the energy data from two devices from any IP address, anywhere in the world. This free tool is available at **www.eaton.com/pxgx**.

Securely view critical power data how and when you choose

Eaton provides the information needed to make critical power management decisions to keep the organization running effectively and efficiently.

You can rest assured that your information is secure when employing the PXGX PDP. It provides password authentication to keep access to configuration separate from general use. For those seeking additional security, the PXGX PDP supports secure, Web-based communication via SSL.

Remotely configure and edit panel and breaker settings from your desk

Improve productivity with Eaton's ability to remotely configure or edit panel and breaker settings in your PDU, RPP or RPM with the on-board configuration pages that guide you through the process. Additionally, the 'Save and Restore' feature provides an effective method to reproduce the configuration if needed at a later time.

View history

Data historical logs, interval logs and event logs can be viewed via Web browser, downloaded for review in MS Excel, or emailed to others for further analysis. In addition, the data can be viewed in Power Xpert Software, Power Xpert Reporting and third party ModbusTCP software systems.

Email messages

You have the ability to customize and direct email notifications to anyone in your organization. Select from alarm notifications, data logs and heartbeat emails. This provides yet one more way to effectively and proactively manage your power system.

Monitor the environment

The Eaton Environmental Monitoring Probe (EMP) option is also supported via the PXGX PDP. The temperature, relative humidity, and status of two contact closures can be viewed in addition to the PDU and RPP data.

Technical specifications

THE POWER XPERT GATEWAY PDP CARD KIT INCLUDES THE FOLLOWING:	
Power Xpert Gateway PDP Card	
Local configuration cable	
Quick start guide	
Ordering information	
Catalog number	PXGXPDP
Style number	103008064-5591
Description	Power Xpert Gateway PDP Card for use with Eaton PDUs/RPPs/RPMs/PDRs/EMS with X-slot compatability
Devices supported	
Eaton Power Distribution Units with X-Slot® compatibility	
Eaton Remote Power Panels with X-Slot compatibility	
Eaton Rack Power Modules with X-Slot compatibility	
Eaton Power Distribution Racks with X-Slot compatibility	
Eaton Energy Management System with X-Slot compatibility	
Communication ports	
Ethernet ports	Two RJ45 ports: supports 10/100 BaseT for daisy chaining via integrated Ethernet switch
Serial ports	One USB port: supports local configuration and one RJ45 for optional connection to an Environmental Monitoring Probe (EMP)
Communication protocols supported	
Web server	Supports data access from Web browsers (HTTP and HTTPS)
Modbus TCP/IP	Supports data access from Modbus TCP clients
SNMP	Supports common network management tools
SMTP	Supports email notification
NTP	Supports time synchronization via an NTP server for card and PDU synchronization
DHCP	Supports automatic IP address assignments, if enabled
IP v4 and v6	IP v4 and IP v6 compatibility

Supported MIBs	
Eaton PDU MIB	
Eaton EMP MIB	
Eaton Alarms and Traps MIB	
RFC 4133 Entity MIB	
RFC 4268 Entity State MIB	
RFC 4268 Entity State MIB Part II	
RFC 1213 MIB II	
Web browsers supported	
IE 7 and 8	
Mozilla Firefox 2.0 and higher	
Google Chrome	
Physical characteristics	
Dimensions	12 cm x 11.4 cm x 3.9 cm (4.7" x 4.5" x 1.5")
Weight	200 grams (7.0 oz)
Environmental specifications	
Ambient operating	0 to +40 ° C (32 to 104° F)
Relative humidity	10 to 80%, non-condensing
Altitude	10,000 ft
Enclosure rating	Indoor use only
Mounting configuration	
X-Slot form factor fits directly into PDU/RPP/RPM/PDR/EMS-UGK chassis	
Power supply	
Nominal input voltage	12 VDC, unregulated (provided by PDU/RPP)
Input voltage range	8 – 25 VDC, unregulated
Power consumption	
3.5 watts	
Regulatory/standards compliance	
FCC Part 15, Class A	
CISPR 22, Class A	
ROHS compliant	
Telecom conducted via EU Standard	EU Standard: EN 55022:2006 Class A EN 55024:1998+A1:2001:A2:2003

Note: Features and specifications listed in this document are subject to change without notice and represent the maximum capabilities of the software and products with all options installed. This is not a complete feature list. Features and functionality may vary depending on selected options.

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February 2011

Powering Business Worldwide

FieldServer Technologies
A Sierra Monitor Company



Serial/Ethernet

QuickServer
Gateway

*QuickServer is a high performance, fully configurable, cost effective **Building and Industrial Automation gateway** for integrators to easily interface devices to networks in commercial buildings and industrial plants.*

System integrators world-wide have benefitted from the value of the powerful line of interoperability gateways offered by FieldServer Technologies. Now, QuickServer adds to that value by running the same robust FieldServer protocol conversion software on a highly cost effective platform backed by the experience, engineering expertise and proven technical support that integrators have come to expect from FieldServer.

QuickServer is available in two series. The **FS-QS-10XX** Series is preloaded with two BAS drivers (serial, Ethernet and/or LonWorks) from a choice of Modbus RTU, Modbus TCP, BACnet/IP®, BACnet MS/TP, LonWorks®, JCI Metasys® N2 and SNMP. Each QuickServer can handle up to 250 points.

The **FS-QS-12XX** Series QuickServer is available to use any Serial, Ethernet or LonWorks driver in the extensive FieldServer driver library. The FS-QS-12XX Series can handle up to 500 points and is available with a choice of RS-485, RS-232 or RS-422 serial ports, or KNX, in addition to Ethernet and LonWorks (optional).

Each QuickServer includes browser-based tools to make it easy to set-up QuickServer and perform diagnostics including determination of status, network settings, node information, map descriptors and more. The USB flash drive also includes the Discovery utility to determine what FieldServers are on a network.



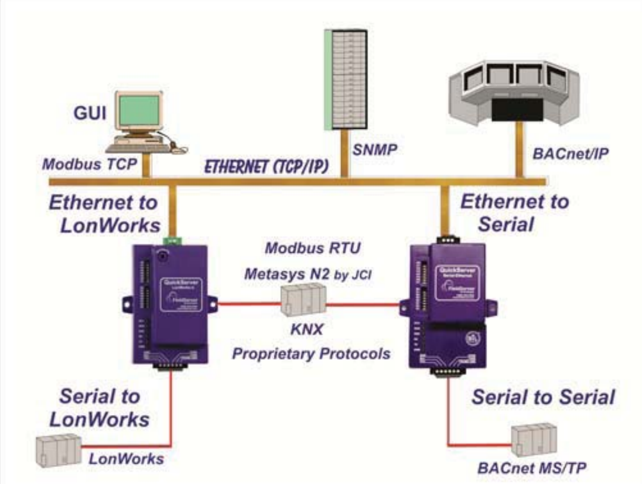
LONMARK 3.4 LonWorks

QuickServer Key Features:

- Ability to interface up to 250 points (500 points on the FS-QS-12XX)
- Multi-configuration capability; specific configurations selectable via DIP switches or software
- Flat panel mount standard, DIN rail mount option
- DIP switches to select baud rate or node ID on the fly
- BACnet COV support for fast data communication while reducing the traffic over a BACnet network

FieldServer Offers:

- Largest protocol driver library in the industry, providing the solution to your integration needs
- Over 10 years of experience in design and manufacture of building automation gateways with thousands of installation, over 700 translation paths using over 100 protocol drivers
- Trusted, proven technical support before and after shipment
- FieldServer Technologies partners with BAS and Fire Alarm Panel manufacturers and trade associations to ensure that the drivers and hardware meet your highest industry expectations



Accessories:

- Optional Accessory Kit includes AC power supply, DIN mounting bracket assembly, Ethernet cable, mini-screwdriver and a USB flash drive with all data sheets, manuals, ENotes, Discovery tool and more.

FieldServer Technologies, 1991 Tarob Court, Milpitas, California 95035 USA **Web:** www.fieldserver.com
Tel: 408-262-2299, **FAX:** 408-262-2269, **Toll-Free**: 888-509-1970 **Email:** sales@fieldserver.com

QuickServer

FieldServer Technologies

Specifications

Field Connections

QuickServer	RS-232[1]	RS-485[2]	RS-422[3]	KNX[6]	Ethernet[4]	LonWorks[5]
FS-QS-1010		2			1	
FS-QS-1011		1			1	1
FS-QS-1210		2			1	
FS-QS-1211		1			1	1
FS-QS-1220	1	1			1	
FS-QS-1221	1				1	1
FS-QS-1230		1	1		1	
FS-QS-1231			1		1	1
FS-QS-1240		1		1	1	
FS-QS-1241				1	1	1

Interface Connections

1. TX/Rx/GND
2. +/-/Frame Ground
3. See Manual
4. 10/100 Base T
5. FTT10
6. KNX/EIB TP1

Environment

- Operating temperature: -40 to 75°C (-40 to 167°F)
- Relative humidity: 5-90% RH non-condensing

Power Requirements

- 9-30 VDC or 12-24 VAC
- Current draw @ 12V
  - FS-QS-1010, FS-QS-12X0: 150 mA
  - FS-QS-1011, FS-QS-12X1: 279 mA

Physical Dimensions (HxWxD)

- 4.5 x 2.9 x 1.6 in. (11.5 x 7.4 x 4.1 cm)
- 0.4 lbs (0.2 Kg)

Other

- Configuration/Diagnostic utilities
- Capacity: 250 points FS-QS-11XX(500 points FS-QS-12XX)
- Table, Wall or DIN rail mount

Communication

- Baud: 4800, 9600, 19200, 38400, 57600, 115200
- Start Bit: 7, 8
- Stop Bit: 1, 2
- Parity: Even, Odd, None

Approvals

- TUV approved to UL 916 and CSA C22.2 standards
- BTL Mark
- LonMark Certified (FS-QS-1011 and FS-QS-12X1)
- RoHS Compliant
- GOST-R Certified
- CE and FCC

LonMark Certification on the QuickServer FS-QS-1XX1-XXX

- SPID: 80:00:95:46:00:84:04:01
- Profiles:
  - 0000 - Node object (1)
  - 0001 - Open Loop Sensor Object (5)
  - 0003 - Open Loop Actuator Object (5)

Ordering Information

QuickServer is available in multiple driver configurations. Check the website (www.fieldserver.com/QuickServer/) for specific part numbers.

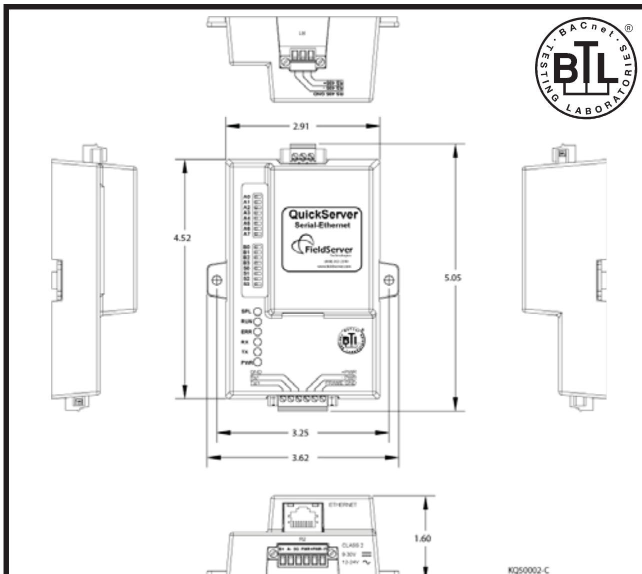
Model	- QuickServer	- Model	- 2nd Serial Port*	- LonWorks	- Protocols
FS-QS	- 1 = QuickServer	- 0 = BAS	- 1 = RS-485	- 0 = None	- 4 digit protocol code
		- 2 = Enhanced	- 2 = RS-232	- 1 = LonWorks	
			- 3 = RS-422		
			- 4 = KNX		

* RS-232/RS-422 / KNX FS-QS-12XX only

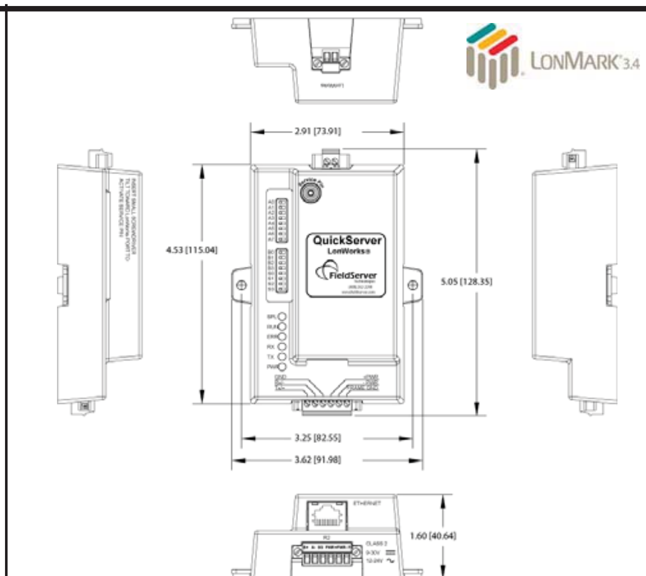
Options

FS-8915-36-QS Accessory Kit, 110/220V

The Accessory Kit consists of a temporary power supply, Ethernet cable, Screwdriver, DIN Rail Mount, and USB flash drive of all manuals, data sheets, Discovery tool and ENotes.



Serial-Ethernet Dimensions



Serial-Ethernet-LonWorks Dimensions

4/2013

FieldServer Technologies, 1991 Tarob Court, Milpitas, California 95035 USA **Web:** www.fieldserver.com
Tel: 408-262-2299, **FAX:** 408-262-2269, **Toll-Free**: 888-509-1970 **Email:** sales@fieldserver.com

150kVA PDU

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Power quality solutions

Power Distribution Unit

Front and rear access



The Eaton line of three-phase power distribution units (PDUs) provide robust power distribution that can be easily tailored to meet the design specifications of any facility or data center. The PDU offers ratings from 50 to 300 kVA and K13 and K20 transformers, including TP-1 efficiency. Energy Management System (EMS) offers cost effective intelligence to manage load efficiency.

Easy Service and Setup

Reduce installation time and save on startup costs

- Backed by Eaton's extensive network of over 240 field technicans for fast reliable service
- Ample cabling space between panelboards and for subfeed breakers
- Standard top and bottom cable access for more flexible installation options
- Front access for operation and general service requirements
- Easily removable side and rear covers with captive hardware
- Front access control panel for all standard communication expansion and maintenance

Monitoring and Connectivity

To understand your power profile

- Eaton's Energy Management System (EMS) provides state-of-the-art monitoring and alarming provisions
- PXGX PDP communication card allows for daisy chaining multiple PDUs together, reducing individual network drops to your power equipment
- Monitor the PDU from any computer without software through the integrated web interface, or easily integrate into existing building management systems or Eaton's Power Xpert Software
- Stores consumption trends for up to 24 months
- Up to 100A branch breaker CTs available
- **Auxiliary contacts to interface with third-party monitoring for subfeed breaker positions**

Safety

Protecting employees, contractors and service personnel

- Protective trim panels cover panelboard bus/breakers/wiring from accidental contact
- Separation of Low/High/Control voltage sections for safer servicing
- UL/CSA approved 60950
- **Shunt trip in subfeed breakers**

Aesthetics and Flexibility

Providing the right form-factor for demanding applications

- Durable finish gives a clean professional appearance to facilities and data centers
- Side car options to expand distribution capacity

Available Options

- Panelboards with 400A panel main breaker
- Additional subfeed breakers
  - 225A (50-150kVA)
  - 225A/400A (200-300 kVA)
- Branch circuit monitoring up to 100A per branch CT
- Plexiglas see-through doors
- Input and ground compression lug provisions
- Air skirts
- Dual input with manual kirk key or sync check interlock
- Lockout breaker tabs
- Auxiliary and shunt trip main cabinet subfeeds
- No local Emergency Power Off option
- Field upgradable capabilities

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TECHNICAL SPECIFICATIONS[1]

Category	Up to 150 kVA	~~200-300 kVA~~
ELECTRICAL CHARACTERISTICS		
kVA	~~50 / 75 / 100 / 125 /~~ 150	~~200 / 225 / 300~~
Input Ratings	~~208 / 380 / 400 / 415 /~~ 480 / ~~600V~~ 3 Phase, 3 Wire + Ground (Single ~~& Dual~~ Input) ~~Dual Input: Basic or Premium[5]~~	
Output Ratings	208V - 3 Phase, 4 Wire + Ground	
Frequency	60 Hz	
Transformer Type	Copper / Double Shielding / Class R (220°C) Insulation	
Transformer Characteristics	150°C Temp. Rise / ~~K13 (Std.)~~ & K20 ~~(Opt.) / Std. &~~ TP-1 Efficiency	
Transformer Compensation Taps	(4) 2 - 1/2% FCBN / (2) 2 - 1/2% FCAN	
Neutral Rating	200%	
POWER DISTRIBUTION		
~~Panelboards~~	~~Up to (6) 42-pole Panels - (2) Panels in Main Cabinet & (4) Panels in Sidecars[2]~~	
~~Panelboard Options~~	~~Cutler-Hammer (Bolt-on or Plug-on) or SquareD Panels (225A & 400A Main Breakers)~~	
Main Cabinet Subfeed Breakers *80% ~~or 100%~~ (CH only) rated*	(4) 225A Subfeeds	~~Up to (12) 225A Frame[2,4] Up to (5) 400A Frame[2] Up to (3) 600A Frame[2]~~
~~Branch Breaker~~	~~Factory installed branch circuit breaker[3]~~	
~~Additional Subfeed Breakers~~	~~Up to (2) 225A Frame~~	~~Up to (2) 225A Frame or (1) 400A Frame~~
~~Sidecars~~	~~Up to (2) Front or Side Facing Sidecars~~	
~~Sidecar Options~~	~~(2) 42-pole Panels or (4) 225A Frame Subfeeds (each Sidecar)~~	
DIMENSIONS		
Main Cabinet	39"W x 35"D x 80"H	~~44"W x 35"D x 80"H~~
~~Front Facing Sidecar~~	~~24"W x 35"D x 80"H~~	
~~Side Facing Sidecar~~	~~9.5"W x 35"D x 80"H~~	
STANDARDS		
	NEMA, UL 60950, CSA 60950	

1. Due to continuing improvements, specifications are subject to change without notice.
2. Please see sales configurator for additional information.
3. Branch breaker schedule required at time of order.
4. When using optional PRL3 chassis, a maximum of (8) 225A Frame breakers can be installed.
5. Dual Input requires a Right Hand Sidecar.

Options

- ~~Dual Input[5]~~
- ~~Branch Circuit Monitoring~~
- ~~100% Rated Sub-Feed breakers~~
- ~~100% Rated Panel Main breakers~~
- Subfeed Breaker Monitoring
- High kAIC main input ~~and subfeed breakers~~
- Surge Protection Device ~~(100 or~~ 200kA) UL1449
- ~~Lightning Arrestor~~
- ~~Transient Suppression Plate~~
- ~~Isolated Ground *(Standard)*~~
- ~~Clear Plexiglas Doors~~
- Load Bank Test Lugs (standard)
- ~~Lockout Breaker Tabs~~
- Air Skirts
- ~~Floor Stands - seismic (12", 18", 24", 36" & 48")~~
- ~~High Voltage Input Junction Box~~
- ~~Low Voltage Control Junction Box~~
- ~~Input & Ground Compression Lugs~~
- ~~Dual Input Basic with Kirk Key Interlock~~
- ~~Dual Input Premium with Sync Check~~

General

- Natural Convection Cooling
- All Swivel Casters
- System Level Metering Included
- 8 x 40 Character LDC Display
- Top & Bottom Entry
- Protective Trim Panels
- Cable management for Input & Panel Wiring
- (2) X-Slots for Communication

Control

- ~~Local EPO (optional)~~
- REPO provisions
- Up to 4 Building Alarm Inputs (N/O or N/C)

Optional custom shutdowns on alarms:

- **Phase Rotation/Loss**
- **Ground/Neutral Overcurrent**
- **Transformer Overtemperature**
- **Output Overload**
- **Input Voltage Out of Tolerance**
- **Frequency Out of Tolerance**

Energy Management System

Monitored Parameters

- Input voltage (L-L & L-N)
- Output voltage (L-L & L-N)
- Output current (A,B & C Phases)
- Output neutral current
- System ground current
- kVA, kW, Hz
- Monthly, yearly, total output kWH
- Input voltage THD (all phases)
- Output voltage THD (all phases)
- Power factor (lead/lag indicator)
- Output current % (A, B & C phases)

Load Profiling

Captures highest and lowest reading on monthly basis with trend information over the last 24 months

- Input/Output Voltage
- Output Current
- Input/Output Frequency
- Output Power Factor
- Output kVA
- Input/Output Voltage THD
- Ground and Neutral Current

Warnings/Alarms

- Over-temp & shutdown
- Input/Output over- & under-voltage
- Input/Output over- & under-frequency
- Input/Output phase rotation
- Input/Output voltage and current THD
- Output Overload (3 Levels)
- Remote EPO
- Building Alarms (4 programmable)
- Summary Alarm
- Communication Fault

Connectivity

- ~~Modbus RTU (RS232/485)~~
- Power Xpert Gateway Card - PXGX PDP (Modbus TCP/IP, SNMP, Ethernet)



~~Aux and Shunt~~



~~Single Input Crimp Lug~~



~~EPO or~~ No EPO Option

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Eaton.com/powerquality

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Table B. Equipment Weight – Front Service Access PDUs

Component	Rating kVA	Maximum Weight kg (lb) Shipping	Installed	Point Loading
PDU	150	1207 (2662)	1170 (2580)	4 at 293 (645)
PDU with single front-facing sidecar	150	1478 (3258)	1423 (3137)	4 at 356 (784)
PDU with single side-facing sidecar	150	1399 (3084)	1357 (2992)	4 at 339 (748)
PDU with dual front-facing sidecar	150	1748 (3854)	1676 (3694)	4 at 419 924)
PDU with dual side-facing sidecar	150	1590 (3506)	1544 (3404)	4 at 386 (851)
PDU with single front-facing sidecar and single side-facing sidecar	150	1669 (3680)	1610 (3549)	4 at 403 (887)
PDU with dual input sidecar	N/A	N/A	N/A	N/A
PDU with dual input sidecar and single front-facing sidecar	150	1686 (3718)	1614 (3558)	4 at 404 (890)
PDU with dual input sidecar and single side-facing sidecar	150	1608 (3554)	1548 (3413)	4 at 387 (853)

5. The recommended clearances around the PDU cabinet are shown in Table C. The clearances specified allow the doors on the cabinets to open a full 180°.

Table C. PDU Cabinet Clearances

From the Top of the Cabinet	Minimum 457.2 mm (18") for ventilation
From the Front of the Cabinet	914.4 mm (36") working space
From the Back of the Cabinet (if side access is available)	Minimum 101.6 mm (4") for ventilation 508 mm (20") for side-facing sidecar door clearance
From the Back of the Cabinet (front only service access PDU)	Minimum 101.6 mm (4") for ventilation 508 mm (20") for side-facing sidecar door clearance
From the Back of the Cabinet (if side access is not available)	Minimum 914.4 mm (36") for working space
From the Right or Left Side of the Cabinet (PDU only, no sidecars)	Minimum 914.4 mm (36") from one side for working space or rear access 508 mm (20") for door clearance
From the Right or Left Side of the Cabinet (PDU and front-facing sidecars)	Minimum 914.4 mm (36") from one side for working space or rear access 610mm (24") for door clearance
From the Right or Left Side of the Cabinet (PDU and side-facing sidecars)	Minimum 914.4 mm (36") for working space or rear access

6. The basic environmental requirements for PDU operation are:
   - Ambient Temperature Range: 0–40°C (32–104°F)
   - Recommended Operating Range: 20–25°C (68–77°F)
   - Maximum Relative Humidity: 95%, noncondensing

The PDU cooling requirements are shown in Table D.

Table D. PDU Cooling Requirements During Full Load Operation

Rating		Voltage		Heat Rejection		
kVA	K-factor	Input	Output	Watts	BTU/hr	Kg-cal/hr
50	13	208	208/120	1118	3814.77	961.31
50	13	480	208/120	2018	6885.70	1735.17
50	20	480	208/120	2020	6892.53	1736.89
75	13	208	208/120	2640	9008.05	2269.99
75	13	480	208/120	3415	11652.46	2936.37
75	20	480	208/120	2214	7554.48	1903.70
100	13	480	208/120	5590	19073.87	4806.53
100	20	480	208/120	5438	18555.22	4675.84
125	13	480	208/120	3872	13211.81	3329.32
125	20	480	208/120	2903	9905.45	2496.13
150	20	208	208/120	3200	10918.85	2751.50
150	13	480	208/120	5506	18787.25	4734.31
150	20	480	208/120	5410	18459.68	4651.76
150	13	600	208/120	3445	11754.83	2962.17

Table J. Input/Output Ratings and External Wiring Requirements for the Eaton 150 kVA PDU (480V)

		Units	Rating 60 Hz				
Basic Unit Rating		kVA	50	75	100	125	150
Input/Output Voltage		Volts	480/208	480/208	480/208	480/208	480/208
AC Input to PDU (3) Phases, (1) Ground	**A**	Maximum Amps	61	92	122	153	184
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil [CSA – mm2] (each)	#4 [21] 1	#2 [34] 1	1/0 [54] 1	3/0 [85] 1	2/0 [67] 2
Minimum Conductor Size (Ground) Number per Phase	—	AWG or kcmil [CSA – mm2] (each)	#8 [8] 1	#6 [13] 1	#6 [13] 1	#6 [13] 1	#4 [21] 1
AC Output	—	Maximum Amps	139	208	278	347	416
AC Output from Subfeed Breakers to the Critical Load (3) Phases, (1) Neutral, (1) Ground	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings, power cable termination sizes listed in Table T, and national and local electrical codes. Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating. Wire 100% rated adjustable subfeed breakers for maximum rated current.					
AC Output from Distribution Panel Breakers to the Critical Load	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard). Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating.					

NOTE Callout letters **A** and **B** map to Figure A-19 or Figure A-19.

Table K. Input/Output Ratings and External Wiring Requirements for the Eaton 150 kVA PDU (600V)

		Units	Rating 60 Hz				
Basic Unit Rating		kVA	50	75	100	125	150
Input/Output Voltage		Volts	600/208	600/208	600/208	600/208	600/208
AC Input to PDU (3) Phases, (1) Ground	**A**	Maximum Amps	49	74	98	122	147
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil [CSA – mm2] (each)	#6 [13] 1	#3 [27] 1	#1 [43] 1	1/0 [54] 1	3/0 [85] 1
Minimum Conductor Size (Ground) Number per Phase	—	AWG or kcmil [CSA – mm2] (each)	#8 [8] 1	#8 [8] 1	#6 [13] 1	#6 [13] 1	#6 [13] 1
AC Output	—	Maximum Amps	139	208	278	347	416
AC Output from Subfeed Breakers to the Critical Load (3) Phases, (1) Neutral, (1) Ground	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings, power cable termination sizes listed in Table T, and national and local electrical codes. Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating. Wire 100% rated adjustable subfeed breakers for maximum rated current.					
AC Output from Distribution Panel Breakers to the Critical Load	**B**	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions, and national and local electrical codes (output is prewired to the panelboard). Maximum output ratings are to be in accordance with the rating label on the PDU. The total combined load is not to exceed the maximum output rating.					

NOTE Callout letters **A** and **B** map to Figure A-19 or Figure A-19.

Table O. Eaton 150 kVA PDU Input Power Cable Terminations (415V)

Terminal Function	Rating (kVA)	Main Breaker Rating	Terminal	Function	Number and Size of Pressure Termination	Tightening Torque Nm (lb in)	Type and Size Screw
AC Input to Main Breaker CB1 (and CB2, if installed)	50	90A	A (Black)	Phase A	1 – #14 – 1/0	#14–10: 4 (35) #8: 4.5 (40 #6–#4: 5.1 (45) #3–1/0: 5/6 (50)	Slotted
			B (Red)	Phase B	1 – #14 – 1/0		Slotted
			C (Blue)	Phase C	1 – #14 – 1/0		Slotted
	75	150A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	100	200A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	125	250A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	150	300A	A (Black)	Phase A	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			B (Red)	Phase B	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			C (Blue	Phase C	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
Customer Ground	All	All	G (Green)	Ground	2 – #14 – 1/0	5.6 (50)	5/16” Hex

Table P. Eaton 150 kVA PDU Input Power Cable Terminations (480V)

Terminal Function	Rating (kVA)	Main Breaker Rating	Terminal	Function	Number and Size of Pressure Termination	Tightening Torque Nm (lb in)	Type and Size Screw
AC Input to Main Breaker CB1 ~~(and CB2, if installed)~~	50	80A	A (Black)	Phase A	1 – #14–1/0	#14–10: 4 (35) #8: 4.5 (40 #6–#4: 5.1 (45) #3–1/0: 5/6 (50)	Slotted
			B (Red)	Phase B	1 – #14–1/0		Slotted
			C (Blue)	Phase C	1 – #14–1/0		Slotted
	75	125A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	100	150A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	125	200A	A (Black)	Phase A	1 – #4–4/0	13.5 (120)	5/16” Hex
			B (Red)	Phase B	1 – #4–4/0	13.5 (120)	5/16” Hex
			C (Blue	Phase C	1 – #4–4/0	13.5 (120)	5/16” Hex
	150	225A	A (Black)	Phase A	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			B (Red)	Phase B	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
			C (Blue	Phase C	2 – 2/0–250 kcmil	31 (275)	5/16” Hex
Customer Ground	All	All	G (Green)	Ground	2 – #14–1/0	5.6 (50)	5/16” Hex

Table S. Recommended (or Equivalent) Installation Parts and Tools (Not Supplied by Eaton)

Part	Size	Quantity	Manufacturer	Part Number	Notes
Long Barrel 2-Hole Lug	#8 AWG	As required	Thomas & Betts	54850BE	Copper wire only
	#6 AWG		Thomas & Betts	54852BE	
	#4 AWG		Thomas & Betts	54854BE	
	#3 and #2 AWG		Thomas & Betts	54856BE	
	#1 AWG		Thomas & Betts	54858BE	
	1/0 AWG		Thomas & Betts	54860BE	
	2/0 AWG		Thomas & Betts	54862BE	
	3/0 AWG		Thomas & Betts	54864BE	
	4/0 AWG		Thomas & Betts	54866BE	
	250 MCM		Thomas & Betts	54868BE	
	300 MCM		Thomas & Betts	54870BE	
	350 MCM		Thomas & Betts	54872BE	
	400 MCM		Thomas & Betts	54874BE	
	500 MCM		Thomas & Betts	54876BE	
Manual Hydraulic Crimp Tool	14 Ton	1	Thomas & Betts	TBM14M	
Die Set	N/A	1	Thomas & Betts	15506	
NOTE Equivalent parts are acceptable.					

20. Terminals are UL and CSA rated at 75°C. See Table T for output power cable terminations. Paragraph A.5 shows the location of output power cable terminals inside of the PDU cabinet.

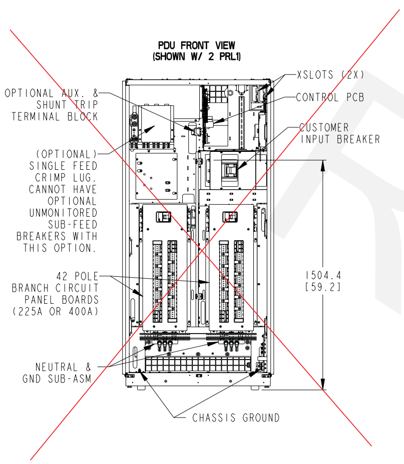
21. DO NOT overtighten the terminal lugs to prevent stripping the threads. Tighten lugs to the torque values in Table T.

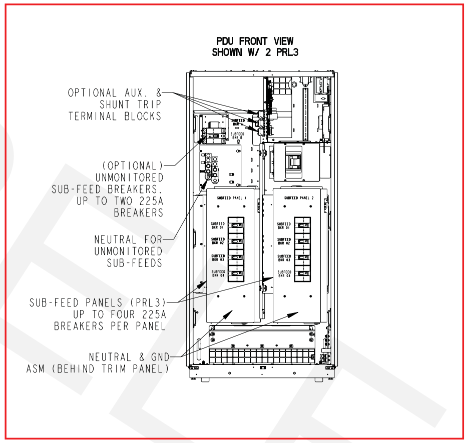
Table T. Eaton 150 kVA PDU Output Power Cable Terminations

Terminal Function	Breaker Rating	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type and Size Screw
AC Output from Subfeed Breakers to Critical Load	("F" Frame)	A	Phase A	1 – 4/0	31 (275)	5/16" Hex
		B	Phase B	1 – 4/0	31 (275)	5/16" Hex
		C	Phase C	1 – 4/0	31 (275)	5/16" Hex
		N	Neutral	1 – 4/0	31 (275)	5/16" Hex
		G	Ground	84 – #4–#14 or 2 x #12–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)	Slotted
	Wire branch circuits in accordance with branch circuit breaker manufacturer's ratings and instructions and national and local electrical codes (output is prewired to the panelboard).					
AC Output from Distribution Panel Breakers to Critical Load	N/A	N	Neutral	84 – #4–#14 or 2 x #12–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)	Slotted
	N/A	G	Ground	84 – #4–#14 or 2 x #12–#14	#4–#6: 4.0 (35) #8: 2.8 (25) #10–#14: 2.3 (20)	Slotted

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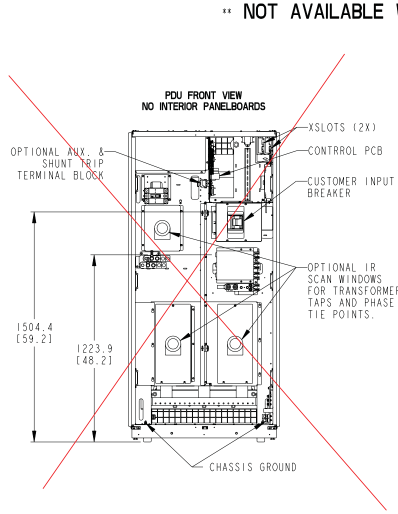
50-150KVA STANDARD SERVICE ACCESS

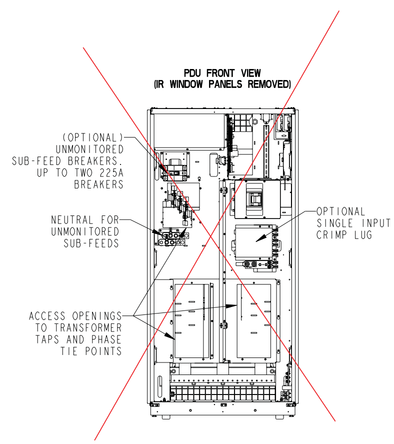


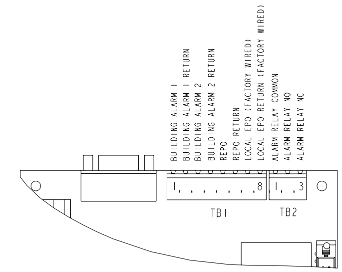


50-150KVA FRONT SERVICE ACCESS

** NOT AVAILABLE WITHOUT SIDECAR DISTRIBUTION **

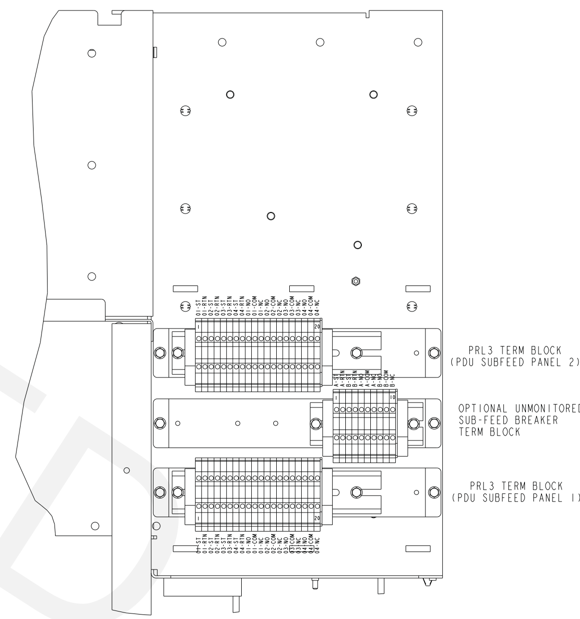






CONTROL PCB

SCALE 1/1



(OPTIONAL)
AUX & SHUNT TRIP
TERMINAL BLOCKS

SCALE 1/2

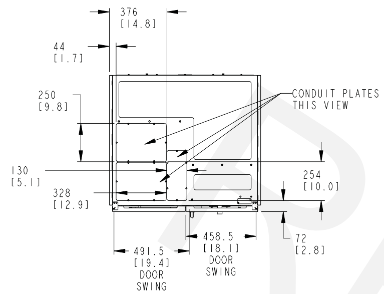
REF PROE MODELS
P-110000036_FRT-SVC.ASM
P-110000036_STD-SVC.ASM
P-110000037_FRT-SVC.ASM
P-110000037_STD-SVC.ASM

METRIC	THIRD ANGLE PROJECTION	EATON CORPORATION, ELECTRICAL	EATON	SIZE: D
DESCRIPTION: SITE PLAN INFORMATION, 50-300KVA PDU AND SIDECAR				
MODIFIED BY: T. Wallace	DATE: 15-Aug-2011	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE:		SCALE: 1/16
ECO: ECO-024485	STATE: Release	DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING		DO NOT SCALE DRAWING OR CHANGE MANUALLY
PRO-ENGINEER GENERATED		PART NAME: P-110000035	REVISION: 001	SHEET: 1 OF 5

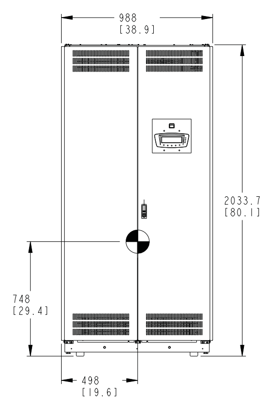
50-150KVA PDU

REF P-110000035 FOR INSIDE VIEWS,
ONELINE & CUST. WIRING INFO.

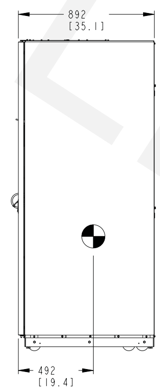
TOP VIEW



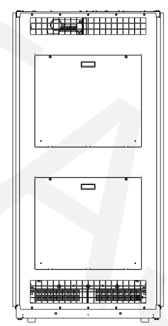
FRONT VIEW



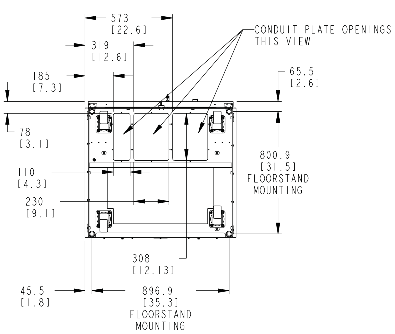
SIDE VIEW



BACK VIEW



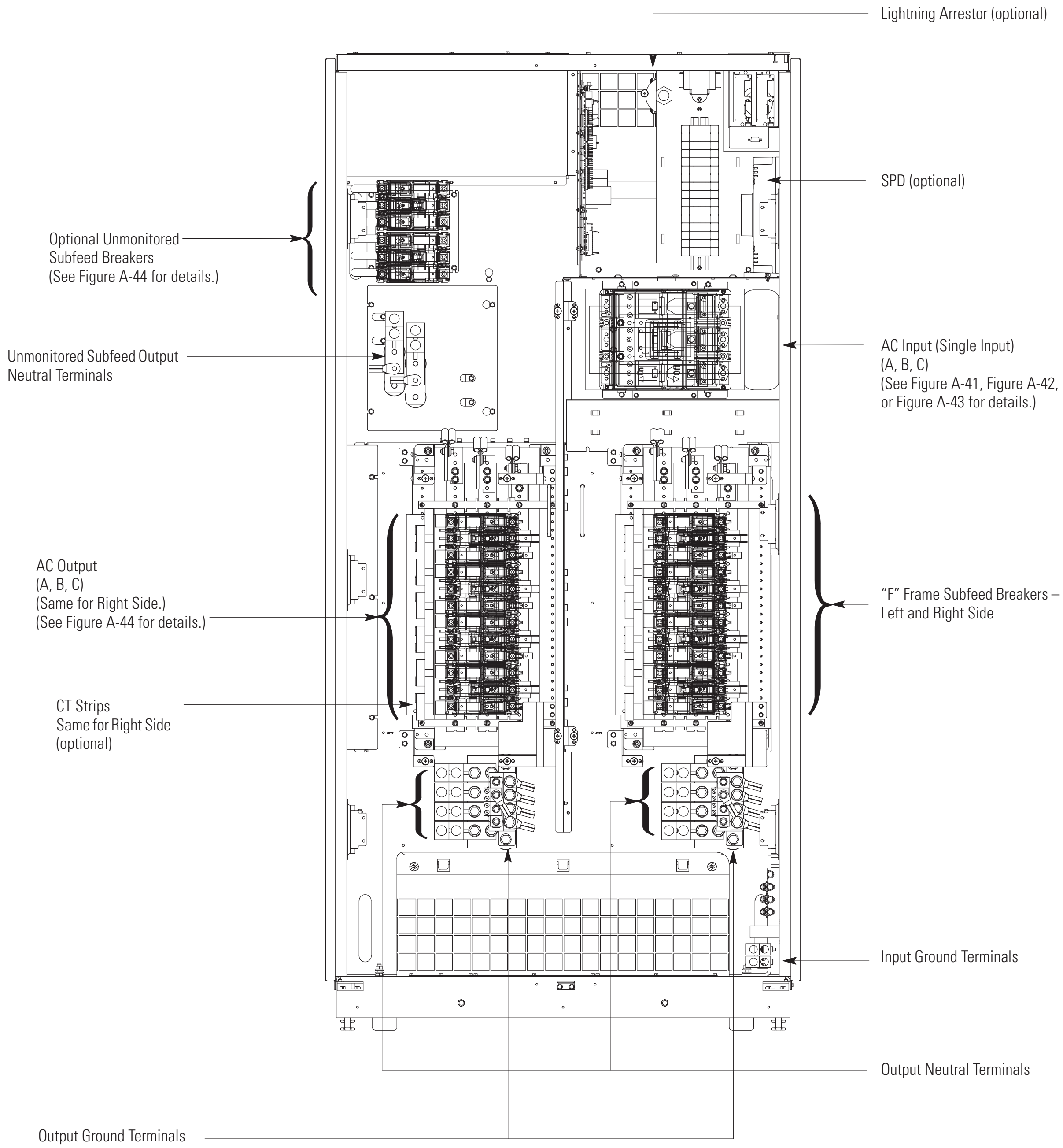
BOTTOM VIEW



NOTES:
1. WEIGHT (150KVA TRANSFORMER AND 2 PRL1 400A PANEL BOARDS):
   STANDARD SERVICE ACCESS UNIT - 1262 KG (2782 LBS)
   * FRONT SERVICE ACCESS ONLY - 1170 KG (2580 LBS)
   *FRONT SERVICE ACCESS ONLY UNITS DO NOT HAVE INTERNAL PANEL BOARDS.
   * FRONT SERVICE ACCESS ONLY UNITS NOT AVAILABLE WITHOUT SIDECAR DISTRIBUTION.
   DIFFERENT CONFIGURATIONS MAY HAVE DIFFERENT WEIGHTS.
2. THE SYSTEM MUST BE INSTALLED ON A LEVEL FLOOR SUITABLE FOR COMPUTER OR ELECTRONIC EQUIPMENT.
3. THE SYSTEM MUST BE INSTALLED IN A TEMPERATURE AND HUMIDITY CONTROLLED INDOOR AREA FREE OF CONDUCTIVE CONTAMINANTS.
4. AMBIENT TEMPERATURE RANGE: 0-40C (32-104F):
   RECOMMENDED OPERATING RANGE: 20-25C (68-77F):
   MAXIMUM RELATIVE HUMIDITY: 95% NON-CONDENSING.
5. MINIMUM 457.2mm (18"). CLEARANCE IN FRONT AND MINIMUM 101.6mm (4") IN REAR OF THE CABINET ARE REQUIRED FOR COOLING AIR INTAKE.
   REAR SERVICING SPACE FOR STANDARD SERVICE ACCESS UNITS IS 609.6mm (24").
6. TOP AND BOTTOM CABLE ENTRIES THROUGH REMOVABLE ACCESS PLATES ARE STANDARD FOR ALL CONFIGURATIONS. ACCESS PLATES SHALL BE CUSTOM MODIFIED TO SUIT CONDUIT SIZES.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRIC CODES.
8. CENTER OF GRAVITY LOCATION SHOWN FOR PDU ONLY.
9. SPECIFICATIONS ARE SUBJECT TO CHANGE.

REF PROE MODEL
P-110000036_FRT-SVC.ASM

METRIC	THIRD ∠ PROJECTION	EATON CORPORATION, ELECTRICAL	SIZE: D
DESCRIPTION: SITE PLAN, 50-150KVA STD & FRT SERVICE ACCESS PDU			
MODIFIED BY: T. Wallace	DATE: 9-Aug-2011	UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS ARE: ANGLES: ±1/2° DECIMALS: 0,X: ±0,75 X, (FOR X < 3): ±1 HOLES: Ø±0,13 0,XX: ±0,25 X, (FOR X > 3): ±2,5 DIMENSIONS ARE IN MILLIMETERS [INCHES] AND AFTER PLATING	SCALE: 1/16 DO NOT SCALE DRAWING OR CHANGE MANUALLY
ECO: ECO-023641	STATE: Release		
PRO-ENGINEER GENERATED	PART NAME: P-110000036-001	REVISION: 001	SHEET: 1 OF: 1



NOTE The PDU is shown with eight subfeed breakers. However, the installed configuration may contain one to eight subfeed breakers.

Figure A-29. Power Terminal Locations – PDU with Left and Right "F" Frame Subfeed Breakers

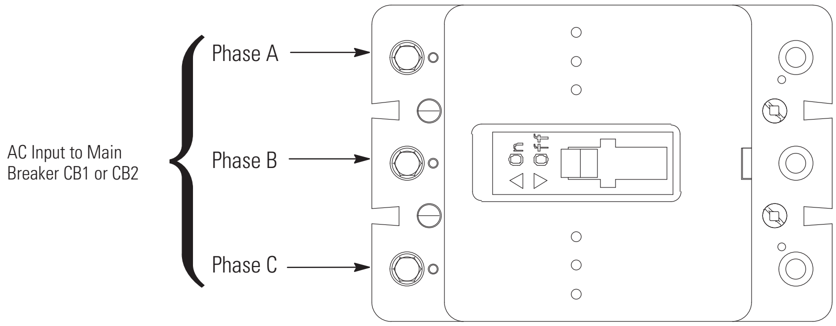


Figure A-41. Power Terminal Locations – "F" Frame PDU Input Main Breaker CB1 or CB2 Terminal Detail

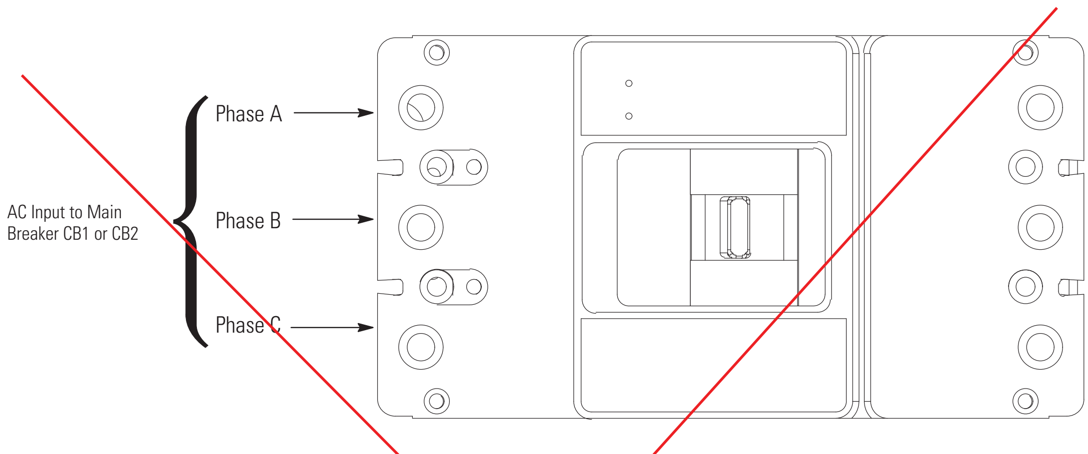


Figure A-42. Power Terminal Locations – "K" Frame PDU Input Main Breaker CB1 or CB2 Terminal Detail

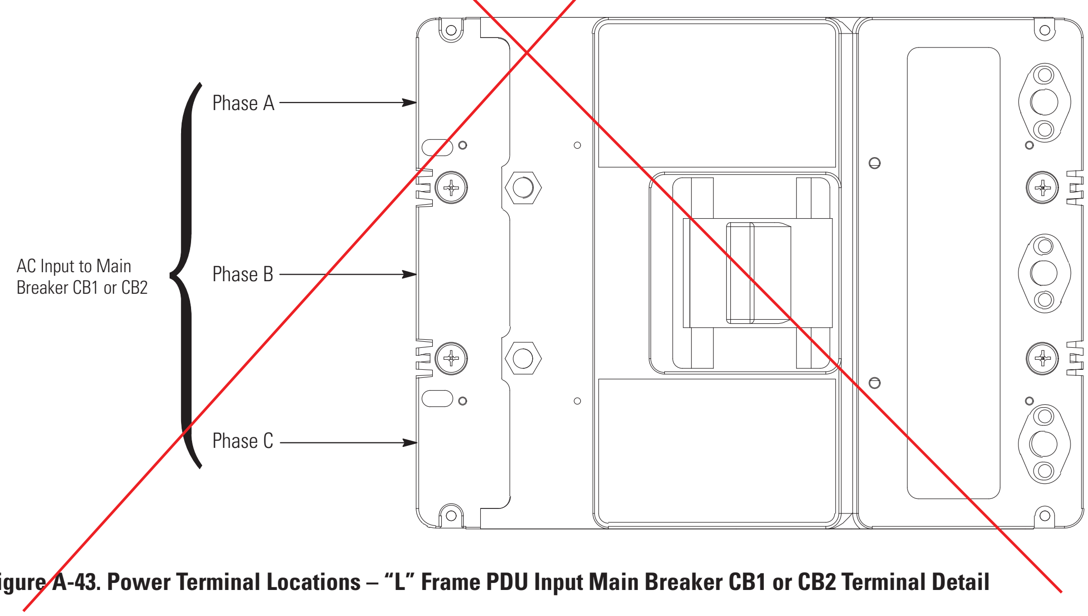


Figure A-43. Power Terminal Locations – "L" Frame PDU Input Main Breaker CB1 or CB2 Terminal Detail

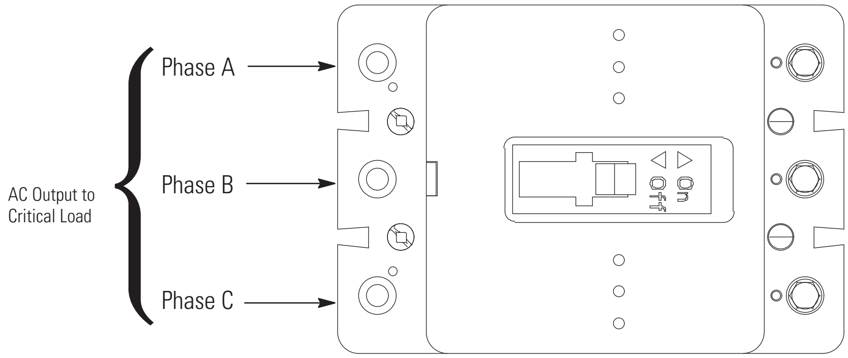


Figure A-44. Power Terminal Locations – "F" Frame Output Subfeed Breaker Terminal Detail

A.6 Interface Wiring Notes

Control wiring for features and options should be connected at the customer interface terminal blocks located inside the PDU.

WARNING

Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.

WARNING

Alarm relay contacts should not be operated in excess of 30 Vac @ 5A maximum.

1. Use Class 1 wiring methods (as defined by the NEC) for interface wiring up to 30V. The wire should be rated at 24V, 1A minimum.
2. Use Class 2 wiring methods (as defined by the NEC) for interface wiring from 30 to 600V. The wire should be rated at 600 volts, 1A minimum and 12 AWG maximum.
3. Use twisted-pair wires for each input and return or common.
4. All interface wiring and conduit is to be provided by the customer.
5. When installing external interface wiring (for example, building alarm, relay output, and X-Slot) to the PDU interface terminals, conduit must be installed between each device and the PDU cabinet.
6. Install the interface wiring in separate conduit from the power wiring.
7. All building alarm inputs require an isolated normally-open or normally-closed contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts. All relay and switch contacts are customer-supplied.
8. The building alarms can be programmed to display the alarm functional name using the front panel LCD.
9. Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac and 28 Vdc.
10. Alarm relay wiring should be a minimum of 22 AWG.
11. See Table U, Figure A-45 through Figure A-55, and Chapters 3 and 7 for interface wiring.
12. LAN drops for use with X-Slot connectivity cards must be provided by facility planners or the customer.

Table U. UCB TB1 and TB2 Interface Connections

TB1 Terminal	Name	Description
1	Building Alarm 1	Input: Programmable PDU alarm, activated by a remote dry contact closure. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts.
2	Building Alarm 1 Return	
3	Building Alarm 2	Input: Programmable PDU alarm, activated by a remote dry contact closure. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts.
4	Building Alarm 2 Return	
5	REPO	Input: normally-open or normally-closed dry contact used to activate PDU EPO from a remote switch. The factory default configuration is set up for use with a normally-open switch. To use a normally-closed switch, the configuration must be changed during setup by an Eaton Customer Service Engineer.
6	REPO Return	
7	Local EPO	Input: Dry contact to activate PDU EPO of from factory wired local cabinet-mounted EPO switch.
8	Local EPO Return	
TB2 Terminal	**Name**	**Description**
1	Alarm Relay Common	Output: General purpose normally-open (NO) and normally-closed (NC) relay contacts. Set by default to signal when a panelboard or subfeed breaker overload occurs.
2	Alarm Relay NO	
3	Alarm Relay NC	

NOTE "Return" indicates connection to electronics circuit ground. "Common" indicates connection to common side of isolated relay contact.

Table V. PDU Aux & Shunt Trip Wiring Terminal Block Terminations

Terminal Function	Rating	Size of Pressure Termination	Tightening Torque Nm (lb in)	Type Screw	Comment
Shunt Trip or Auxiliary Contacts	600V, 20A	#26–#12	0.4 (3.5) - 0.8 (7.1)	Slotted	Use twisted-pair wires for each input and return or common. Strip wire insulation back 10 millimeters to wire terminal blocks.

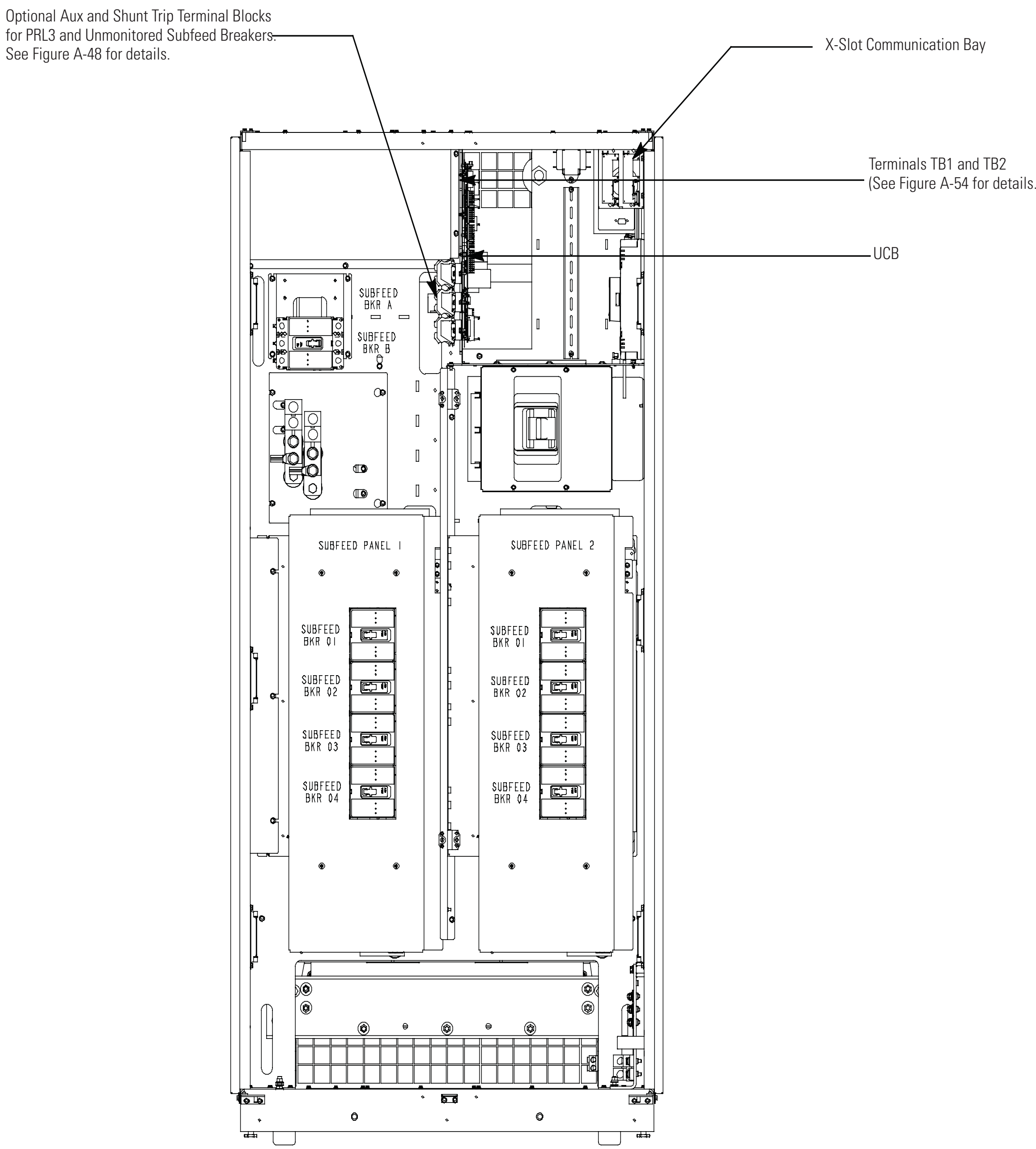
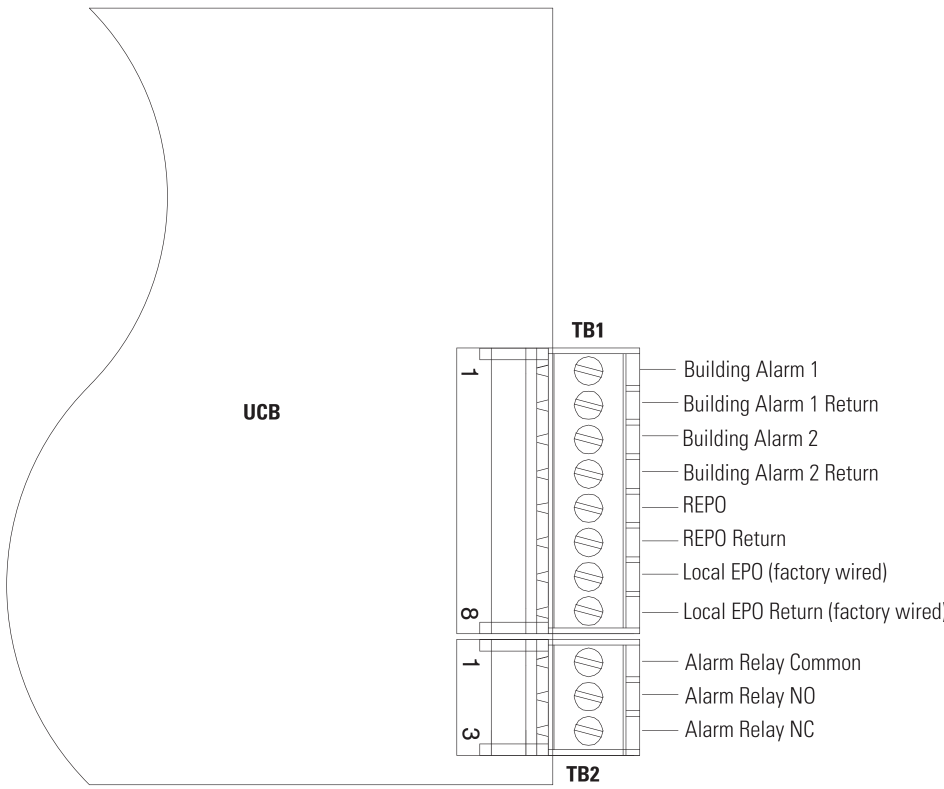


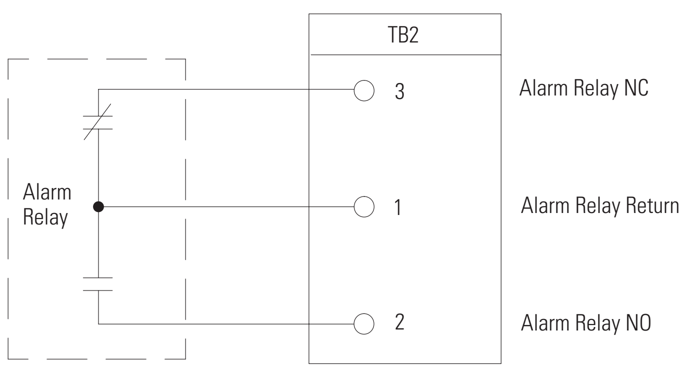
Figure A-46. PDU Interface Terminal Locations for Two PRL3 and Subfeed Breaker Monitoring



NOTE All building alarm inputs require an isolated normally-open or normally-closed contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal as shown. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts. All control wiring and relay and switch contacts are customer-supplied.

NOTE The building alarms can be programmed to display the alarm functional name using the front panel LCD controls.

Figure A-54. PDU Interface Terminal Detail



NOTE Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac and 28 Vdc.

NOTE Alarm relay wiring should be a minimum of 22 AWG.

NOTE Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.

NOTE Relay is shown in de-energized state. By default, the relay changes state when a panelboard or subfeed breaker overload occurs.

Figure A-55. Typical Alarm Relay Connection

A.10 Optional Air Skirt

An air skirt can be installed around the perimeter of the PDU Main Unit and any sidecars installed with the PDU. An air skirt helps contain air flow under the PDU. See Figure A-63 through Figure A-68 for air skirt installation illustrations.

CAUTION

Use air skirts only when the PDU is installed on a raised floor where the raised floor acts as a plenum and provides adequate air flow to the PDU. The side skirts are to keep forced air from escaping, but will block air if installed on a concrete or similar non-raised flat floor. Inadequate air flow will cause the PDU to overheat

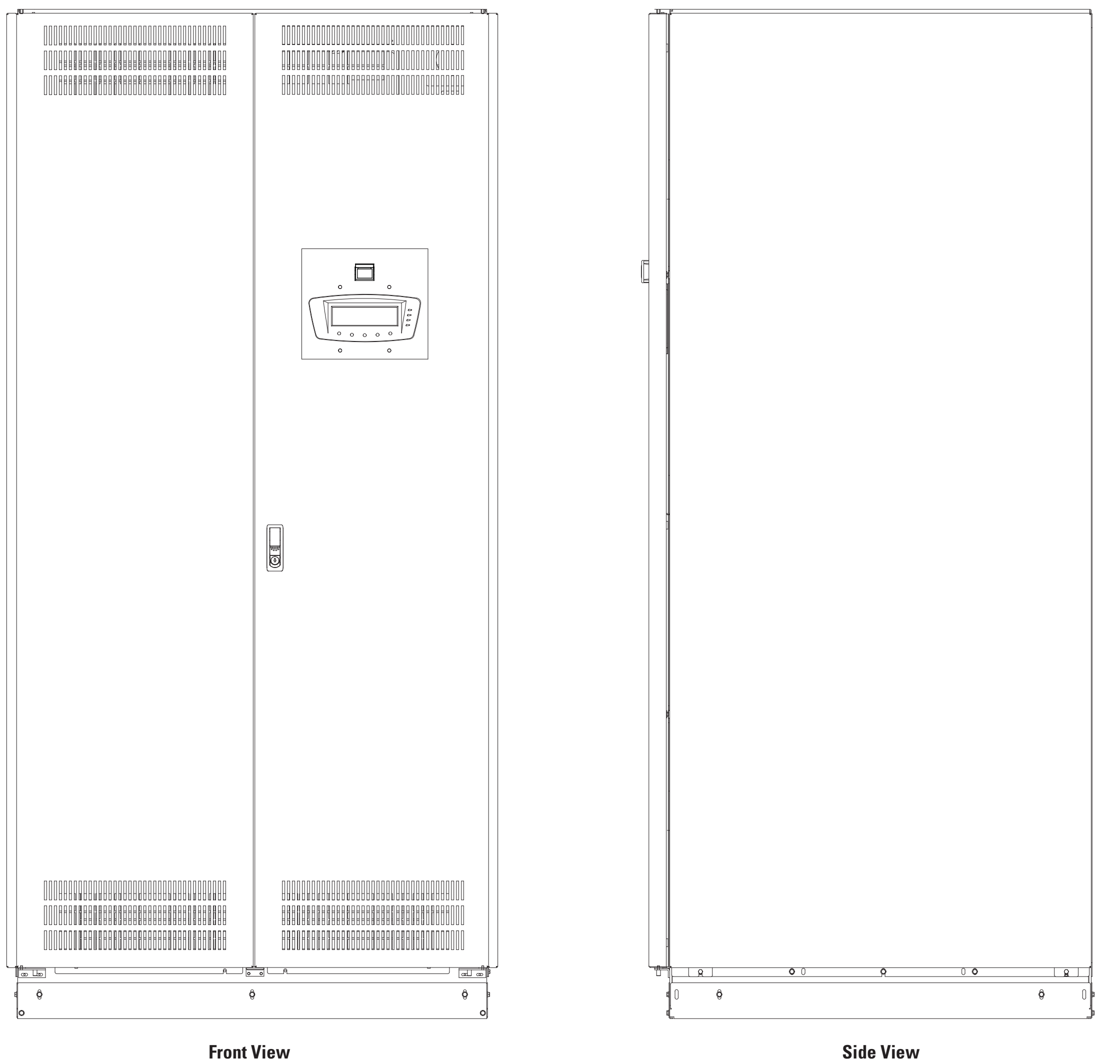


Figure A-63. 150 kVA PDU Main Unit with Optional Air Skirt Installed (Front and Side View)

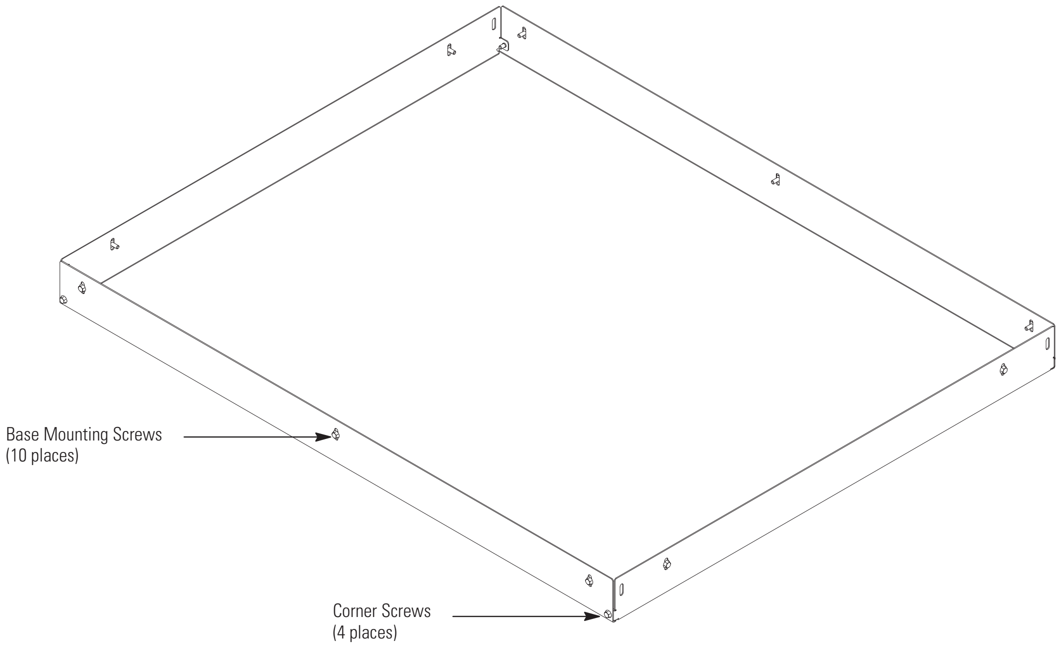


Figure A-66. Air Skirt Footprint for 150 kVA PDU

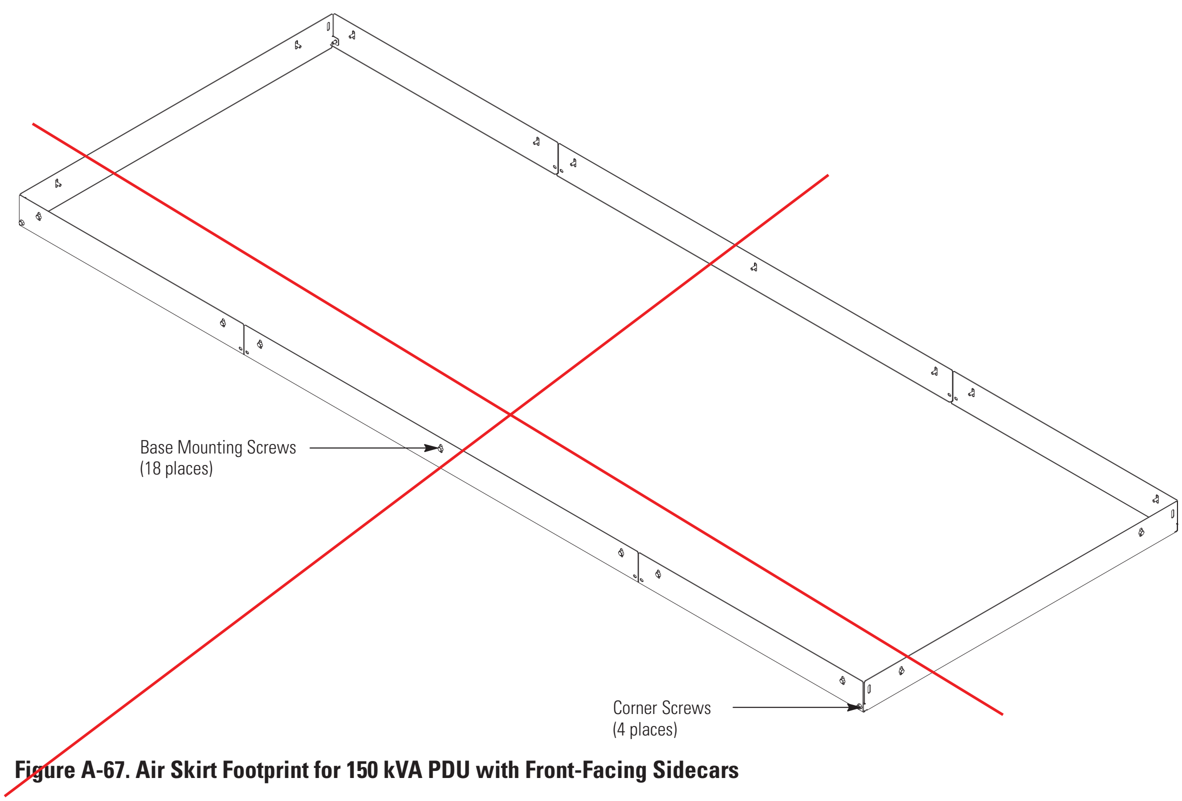


Figure A-67. Air Skirt Footprint for 150 kVA PDU with Front-Facing Sidecars

Eaton Energy Management System





Optimize power utilization and availability at all levels including branch circuits in the Eaton PDU and RPP.

Features

- Continuously monitors power conditions at branch circuit, sub-feed and main breaker levels
- Issues warnings and alarms if current loads or environmental conditions exceed user-defined thresholds
- Tracks event history, with integrated, real-time clock for time stamping
- Collects data from up to eight panelboards and 336 pole positions in a single system
- Makes all data available on a state-of-the-art local display
- Sends data to remote displays or management systems, using optional interface card
- Stores 23 months of data for diagnostics, comprehensive load profiling and energy planning
- Supports power distribution equipment from Eaton and other manufacturers

The power demands of data centers are exponentially larger and more variable than ever before, creating a real management challenge. How can you utilize the power distribution system to its fullest potential, without compromising reliability?

The answers have been elusive under changing conditions. Power consumption can easily double or triple during peak periods, and it fluctuates with every move, add or change. Adding a 1U or 2U server used to mean drawing 300 to 500 more watts from the branch circuit; now, a new blade server consumes 10 times as much current. Even a prominent Internet service provider suffered unplanned downtime in its multi-million-dollar data center because branch breakers kept nuisance tripping.

Demand is up, and so is the imperative for business continuity…so you protect electrical systems with uninterruptible power systems (UPSs), battery backup, generators and system-wide monitoring. Millions of dollars a year are invested in such measures, yet there might still be a proverbial weakest link at the local level: the branch circuit that serves critical equipment.

At this level, you might not be able to see trouble coming until a circuit breaker trips, and that's too late. Systems go down, valuable data is lost and business comes to a standstill. It can take hours to recover.

Some organizations address this concern by periodically checking current loads with handheld meters. Unfortunately, this occasional sampling can easily miss problem conditions, which can appear and disappear in microseconds. Besides, it is expensive to buy or manage permanently installed meters on every branch circuit. Facility managers need a better way to ensure reliable, continuous power at the branch circuit and system level.

Continuous measurement and reporting of branch circuits, sub-feed and main breaker activity, with proactive alarms

The Eaton Energy Management System continuously measures the current on all breaker levels and warns you of impending trouble, so you can take proactive action. Armed with these insights, data center and facilities managers can more effectively manage energy consumption to prevent overload conditions, optimize power distribution, and, when applicable, allocate energy costs among internal departments.

Powering Business Worldwide

The architecture of the monitoring system is straightforward, which makes it stable and reliable. Branch circuit wires are threaded through current transducers (CTs), which sense the current level going through the wire and send the information to a universal controller. CTs are also used for sub-feed and main breakers. The controller assimilates the information from CTs at multiple panelboards and then relays it to a local display or remote management system for analysis and reporting. The CTs are exceptionally robust and have a very long life expectancy.

A single system can expand up to six 42-circuit panelboards (up to 252 pole positions or 20 three-pole sub-feeds depending on PDU configuration), in addition to monitoring the main input/output parameters of the distribution equipment, such as a power distribution unit (PDU) or remote power panel (RPP).

Detailed insights into circuit-level power conditions

The Energy Management System assesses circuit activity 24/7 and provides time-stamped metering along with alarm and statistical information for each branch circuit. You get the significant information necessary to effectively manage the edge of the power distribution system.

For example, you can see minimum and maximum current, power, and frequency; power quality metrics such as total harmonic distortion and power factor; time-stamped event records; and more. This information is shown for individual circuits and summarized for each panelboard and at the equipment level, such as PDU or RPP. You get visibility at all levels within one unit.

Early warning of problem conditions

When current on a branch circuit or main circuit breaker reaches a user-defined threshold, the system sends a warning alarm to the local display and the defined communications network, identifying the specific circuit and the condition. The data center or facility manager is alerted, with time-stamped information, before the current approaches the breaker's trip point.

Local and remote access to power monitoring data

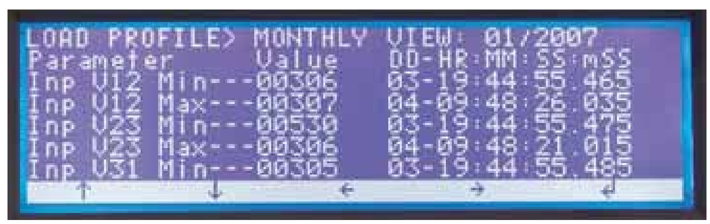
Most other monitoring systems on the market require you to purchase a separate display if you want to view circuit activity and alarms locally or can't review an entire system in a single display.

With this system, a state-of-the-art multi-line LCD local display is included in the base system package. Technicians always have an up-to-the-minute view of power conditions right at the equipment.

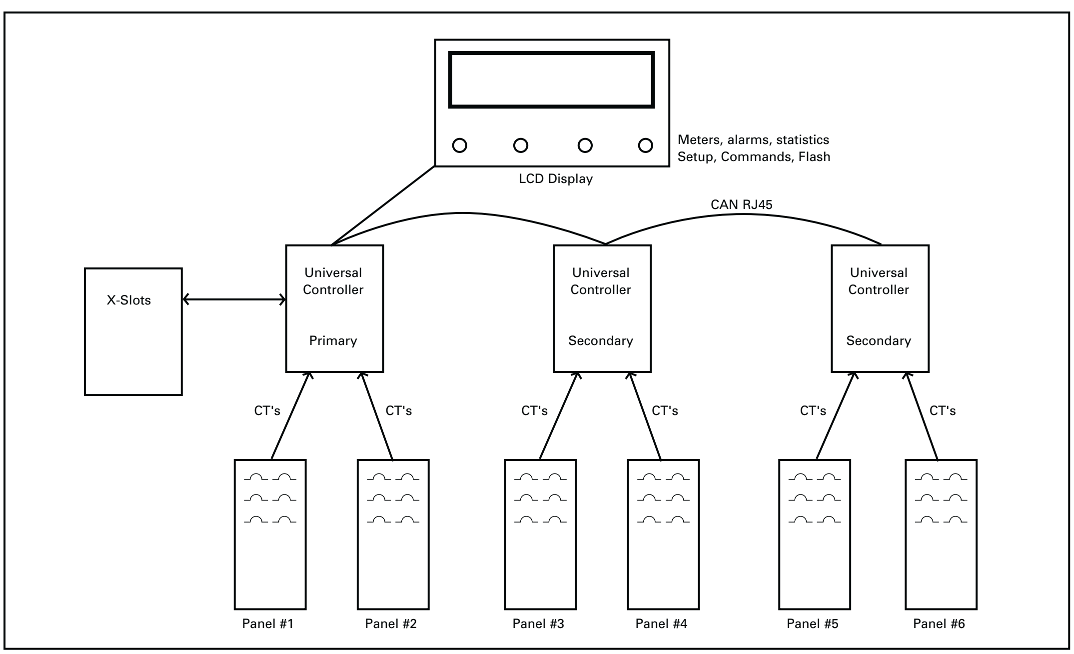
With an optional Power Xpert Gateway 1000 interface card the universal controller sends data to your building management system or power management system (such as Eaton PowerVision® or FORESEER® systems) using industry-standard Modbus and Web/SNMP protocols.

Monitoring of environmental conditions

In addition to readings of electrical activity, the Energy Management System monitors key environmental conditions, such as temperature and humidity of the distribution equipment. For a PDU, the system can measure the temperature of the unit's transformer. These capabilities enable data center managers to identify trouble conditions and then design layouts that avoid undesirable hot spots.



Load profile with date/time stamp



The Eaton Energy Management System sends data from up to six panelboards, up to 252 pole positions, to a single display— and sends warning alarms if conditions could potentially trip any branch or main circuit breaker.

A unique, differentiating feature of the Energy Management System is its ability to archive data and perform load profiling across many months. The information captured from each branch circuit and the main incoming/outgoing circuits is stored on the local PDU control board. An on-board, real-time clock accurately time-stamps all events. All the information can be sent over the LAN to your building management system.

Users can view data for the previous 23 months to gain valuable insight for managing power consumption and diagnosing issues. With this innovative feature, you can assess long-term load trends and optimize utilization of available power at all levels—capabilities that will help extend the useful life of existing infrastructure and delay the need for new investments.

Easy installation in new or retrofit applications

The Energy Management System is designed to complement and effectively work within a broad array of data center and facilities applications. It can be used in a variety of products, such as PDUs, remote power panels and rack-based distribution systems, as well as third-party power distribution equipment. Packaged kits are available for use with any manufacturer's panelboards and breakers. Retrofitting is a simple process, given that the current sensors don't require any calibration in the field, even if the configuration of branch circuits isn't known.

A complete solution

Branch circuit monitoring technology has been field-proven for years, and recent advances in technology and design have made the solution more affordable than ever. It definitely provides cost-effective insurance against tripped circuits and unplanned shutdowns.

When comparing features and technical specifications of different systems, you'll quickly see that the Eaton Energy Management System provides more all-in-one functionality than other vendors' offerings. It has the broadest list of measured and reported critical parameters in the market.

Features such as local display, the ability to shunt trip main breakers, and sub-feed monitoring and coverage for 252 circuits in a single display —which are add-on options or unavailable with other systems—are standard on ours.

Find out more about how the Eaton Energy Management System can add an essential extra layer of reliability to the management of your electrical distribution system. Contact us at **1.800.356.5794** or visit us on the Web at **www.eaton.com/powerquality.**

Sub-feed monitoring



Load profiling; minimum/maximum current and voltage



Per phase percent current. power, power factor



Per phase voltage and current

Branch circuit monitoring



Power consumption information



Alarm thresholds



Branch circuit current



Panel board breaker schedule

Technical Specifications

General
UL and cUL listed
Up to 252 branch circuits monitored on a single display

Input Monitoring
Three-phase voltage: RMS L-L, RMS L-N, RMS %, THD % and frequency
Three-phase current: RMS, RMS %, THD %, Crest Factor
Power: kW, kVA, PF (when input CT option is installed)
Monthly profiling: Time-stamped Min V, Max V, Min I, Max I, Max THD, Min kVA, Max kVA, Power Factor
Active alarms and event logging: Input ACUV, Input ACOV, Input UFOF, Input Phase Rotation, Input Phase Loss, THD

Output Monitoring
Three-phase voltage: RMS L-L, RMS L-N, RMS %, THD % and Frequency
Three-phase current: RMS, RMS %, THD %, Crest Factor
Power metering (kW, kVA, PF)
Power usage (kWH): Monthly, Yearly, Total, Non-volatile
Monthly profiling: Time-stamped Min V, Max V, Min I, Max I, Max THD, Min kVA, Max kVA
Active alarms and event logging: Output ACUV, Output ACOV, Output UFOF, Output Phase Rotation, Three Level Phase Overload, THD, phase loss

System Monitoring
Non-volatile real-time clock
Ground current: RMS
Neutral current: RMS
Monthly profiling: Time-stamped, minimum and maximum ground and neutral current
Active alarms and event logging: ground/neutral current warning, ground current overload, neutral current warning, neutral current overload, transformer over-temperature warning, transformer over-temperature, SPD failure, input breaker open, input breaker tripped, Emergency Power Off, building alarm 1 to 4 (Alarm names for building alarms are programmable by user)

Controls (Optional)
Emergency Power Off
Remote Emergency Power Off
Manual restart
Phase loss protection
Ground fault detection

Due to continuing product improvements specifications are subject to change and new features may be available. Contact your Eaton representative for details.

Environmental parameters (used with EMP and PXGX 1000 card)
Unit temperature calculated in metric or standard (°F and °C)
Optional Transformer (if applicable) temperature (°F and °C)
Optional Humidity within the unit (%)

Individual panel or sub-feed breaker monitoring (42 positions each Panel)
One-, two- or three-phase current: RMS, RMS%
Power: kW, kVA, PF
Power usage (kWH): monthly, yearly, total
Max current/phase, Wmax, VAmax, PFmin, Active alarms and event logging: panel breaker overload warning, panel breaker overload
User can easily add panel breakers
User configurations: breaker rating, number of phases, position, breaker overload alarms, breaker overload warning level

User interfaces
Eight-line by 40-charater LCD local display
Four indicator lamps and alarm horn
Optional emergency power-off switch

Communications
Two serial ports, one shared RS232/X-Slot plus one X-Slot for communication expansion
Standard output alarm relay
Optional X-Slot modbus RTU card
Optional X-Slot PXGX 1000 card

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Andean & Caribbean:
1.949.452.9610
Mexico & Central America:
52.55.9000.5252

EUROPE/MIDDLE EAST/AFRICA
Denmark: 45.3686.7910
Finland: 358.94.52.661
France: 33.1.6012.7400
Germany: 49.0.7841.604.0
Italy: 39.02.66.04.05.40
Norway: 47.23.03.65.50
Portugal: 55.11.3616.8500
Sweden: 46.8.598.940.00
United Kingdom: 44.1753.608.700

ASIA PACIFIC
Australia: 61.2.9693.9366
New Zealand: 64.0.3.343.3314
China: 86.21.6361.5599
HK/Korea/Taiwan: 852.2745.6682
India: 91.11.4223.2300
Singapore/SEA: 65.6825.1668

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EATON
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Power Xpert® Gateway PDP Card



Delivers real-time, Web-enabled monitoring of Eaton® Power Distribution Units, Rack Power Modules and Remote Power Panels

Product snapshot

- Real-time power monitoring presented how you need it – via standard on-board Web pages, Power Xpert Software or 3rd party network or building management systems
- Ethernet switch port allowing for daisy chaining of Ethernet communicating products
- Allows easy and remote configuration and monitoring of the the Eaton Energy Management System (EMS)
- Supports the Eaton Environmental Monitoring Probe

Features and benefits

- **Monitor energy usage -** reveal opportunities and verify results of efficiency improvements
- **Remote Monitoring -** via the Web monitor real-time data and profile energy usage on your power distribution system
- **Web-enabled monitoring of power quality data down to the branch circuit level -** Data can be viewed from any location with a Web browser
- **Configure and edit the EMS remotely via the Web interface -** supports remote configuration including naming, alarm and warning set points, and percentages
- **Data, interval and event logging with time stamp -** Accurate logging for power quality analysis
- **Modbus TCP/IP and SNMP Support -** Open communication protocol facilitates integration with standard building management systems and network management systems
- **Customized email messaging for events notification, including data, interval and event logs and periodic "heartbeat" emails -** Direct alarm and event notification to the appropriate person(s) in the organization
- **Easy integration into existing Ethernet infrastructure -** Minimize installation cost

EATON

Powering Business Worldwide

Monitoring energy in a networked world

The Power Xpert Gateway PDP card (PXGX PDP) is the primary data acquisition solution for Eaton power distribution units (PDUs) remote power panels (RPPs), rack power modules (RPMs), power distribution racks (PDRs), and energy management system upgrade kits (EMSs). Data from the downstream devices are time stamped and stored in non-volatile memory. This interval data can be stored or uploaded to a destination of the user's choice through CSV files. Data can also be accessed through any Web browser directly on the PXGX PDP down to the individual breaker level. Users can view data in Power Xpert Software, BMS, NMS, building dash boards, custom software applications, or virtually any Web interface.

Free Power Xpert Energy Viewer

This free software download works with the PXGX PDP to allow quick and easy views of energy usage and comparison data. Yes, the data is available via a CSV file, however this tool doesn't require a Microsoft® Excel® spreadsheet expert. Simply select the energy parameters you're interested in tracking, and click! It automatically displays energy usage summary information in both tabular and graphical format. You can even compare the energy data from two devices from any IP address, anywhere in the world. This free tool is available at **www.eaton.com/pxgx**.

Securely view critical power data how and when you choose

Eaton provides the information needed to make critical power management decisions to keep the organization running effectively and efficiently.

You can rest assured that your information is secure when employing the PXGX PDP. It provides password authentication to keep access to configuration separate from general use. For those seeking additional security, the PXGX PDP supports secure, Web-based communication via SSL.

Remotely configure and edit panel and breaker settings from your desk

Improve productivity with Eaton's ability to remotely configure or edit panel and breaker settings in your PDU, RPP or RPM with the on-board configuration pages that guide you through the process. Additionally, the 'Save and Restore' feature provides an effective method to reproduce the configuration if needed at a later time.

View history

Data historical logs, interval logs and event logs can be viewed via Web browser, downloaded for review in MS Excel, or emailed to others for further analysis. In addition, the data can be viewed in Power Xpert Software, Power Xpert Reporting and third party ModbusTCP software systems.

Email messages

You have the ability to customize and direct email notifications to anyone in your organization. Select from alarm notifications, data logs and heartbeat emails. This provides yet one more way to effectively and proactively manage your power system.

Monitor the environment

The Eaton Environmental Monitoring Probe (EMP) option is also supported via the PXGX PDP. The temperature, relative humidity, and status of two contact closures can be viewed in addition to the PDU and RPP data.

Technical specifications

THE POWER XPERT GATEWAY PDP CARD KIT INCLUDES THE FOLLOWING:	
Power Xpert Gateway PDP Card	
Local configuration cable	
Quick start guide	
Ordering information	
Catalog number	PXGXPDP
Style number	103008064-5591
Description	Power Xpert Gateway PDP Card for use with Eaton PDUs/RPPs/RPMs/PDRs/EMS with X-slot compatability
Devices supported	
Eaton Power Distribution Units with X-Slot® compatibility	
Eaton Remote Power Panels with X-Slot compatibility	
Eaton Rack Power Modules with X-Slot compatibility	
Eaton Power Distribution Racks with X-Slot compatibility	
Eaton Energy Management System with X-Slot compatibility	
Communication ports	
Ethernet ports	Two RJ45 ports: supports 10/100 BaseT for daisy chaining via integrated Ethernet switch
Serial ports	One USB port: supports local configuration and one RJ45 for optional connection to an Environmental Monitoring Probe (EMP)
Communication protocols supported	
Web server	Supports data access from Web browsers (HTTP and HTTPS)
Modbus TCP/IP	Supports data access from Modbus TCP clients
SNMP	Supports common network management tools
SMTP	Supports email notification
NTP	Supports time synchronization via an NTP server for card and PDU synchronization
DHCP	Supports automatic IP address assignments, if enabled
IP v4 and v6	IP v4 and IP v6 compatibility

Supported MIBs	
Eaton PDU MIB	
Eaton EMP MIB	
Eaton Alarms and Traps MIB	
RFC 4133 Entity MIB	
RFC 4268 Entity State MIB	
RFC 4268 Entity State MIB Part II	
RFC 1213 MIB II	
Web browsers supported	
IE 7 and 8	
Mozilla Firefox 2.0 and higher	
Google Chrome	
Physical characteristics	
Dimensions	12 cm x 11.4 cm x 3.9 cm (4.7" x 4.5" x 1.5")
Weight	200 grams (7.0 oz)
Environmental specifications	
Ambient operating	0 to +40 ° C (32 to 104° F)
Relative humidity	10 to 80%, non-condensing
Altitude	10,000 ft
Enclosure rating	Indoor use only
Mounting configuration	
X-Slot form factor fits directly into PDU/RPP/RPM/PDR/EMS-UGK chassis	
Power supply	
Nominal input voltage	12 VDC, unregulated (provided by PDU/RPP)
Input voltage range	8 – 25 VDC, unregulated
Power consumption	
3.5 watts	
Regulatory/standards compliance	
FCC Part 15, Class A	
CISPR 22, Class A	
ROHS compliant	
Telecom conducted via EU Standard	EU Standard: EN 55022:2006 Class A EN 55024:1998+A1:2001:A2:2003

Note: Features and specifications listed in this document are subject to change without notice and represent the maximum capabilities of the software and products with all options installed. This is not a complete feature list. Features and functionality may vary depending on selected options.

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February 2011

FieldServer Technologies

A Sierra Monitor Company



Serial/Ethernet

QuickServer
Gateway

*QuickServer is a high performance, fully configurable, cost effective **Building and Industrial Automation gateway** for integrators to easily interface devices to networks in commercial buildings and industrial plants.*

System integrators world-wide have benefitted from the value of the powerful line of interoperability gateways offered by FieldServer Technologies. Now, QuickServer adds to that value by running the same robust FieldServer protocol conversion software on a highly cost effective platform backed by the experience, engineering expertise and proven technical support that integrators have come to expect from FieldServer.

QuickServer is available in two series. The **FS-QS-10XX** Series is preloaded with two BAS drivers (serial, Ethernet and/or LonWorks) from a choice of Modbus RTU, Modbus TCP, BACnet/IP®, BACnet MS/TP, LonWorks®, JCI Metasys® N2 and SNMP. Each QuickServer can handle up to 250 points.

The **FS-QS-12XX** Series QuickServer is available to use any Serial, Ethernet or LonWorks driver in the extensive FieldServer driver library. The FS-QS-12XX Series can handle up to 500 points and is available with a choice of RS-485, RS-232 or RS-422 serial ports, or KNX, in addition to Ethernet and LonWorks (optional).

Each QuickServer includes browser-based tools to make it easy to set-up QuickServer and perform diagnostics including determination of status, network settings, node information, map descriptors and more. The USB flash drive also includes the Discovery utility to determine what FieldServers are on a network.



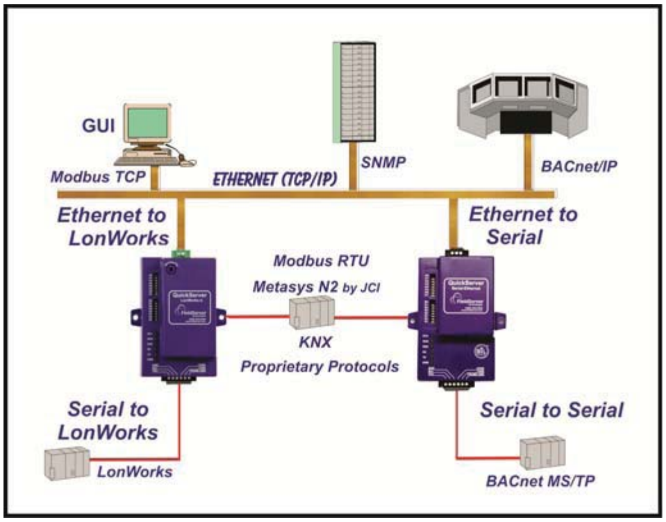
LONMARK 3.4 *LonWorks*

QuickServer Key Features:

- Ability to interface up to 250 points (500 points on the FS-QS-12XX)
- Multi-configuration capability; specific configurations selectable via DIP switches or software
- Flat panel mount standard, DIN rail mount option
- DIP switches to select baud rate or node ID on the fly
- BACnet COV support for fast data communication while reducing the traffic over a BACnet network

FieldServer Offers:

- Largest protocol driver library in the industry, providing the solution to your integration needs
- Over 10 years of experience in design and manufacture of building automation gateways with thousands of installation, over 700 translation paths using over 100 protocol drivers
- Trusted, proven technical support before and after shipment
- FieldServer Technologies partners with BAS and Fire Alarm Panel manufacturers and trade associations to ensure that the drivers and hardware meet your highest industry expectations



Accessories:

- Optional Accessory Kit includes AC power supply, DIN mounting bracket assembly, Ethernet cable, mini-screwdriver and a USB flash drive with all data sheets, manuals, ENotes, Discovery tool and more.

FieldServer Technologies, 1991 Tarob Court, Milpitas, California 95035 USA **Web:** www.fieldserver.com
Tel: 408-262-2299, **FAX:** 408-262-2269, **Toll-Free**: 888-509-1970 **Email:** sales@fieldserver.com

QuickServer

FieldServer Technologies

Specifications

Field Connections

QuickServer	RS-232[1]	RS-485[2]	RS-422[3]	KNX[6]	Ethernet[4]	LonWorks[5]
	Interface Connections					
FS-QS-1010		2			1	
FS-QS-1011		1			1	1
FS-QS-1210		2			1	
FS-QS-1211		1			1	1
FS-QS-1220	1	1			1	
FS-QS-1221	1				1	1
FS-QS-1230		1	1		1	
FS-QS-1231			1		1	1
FS-QS-1240		1		1	1	
FS-QS-1241				1	1	1

1. TX/Rx/GND
2. +/-/Frame Ground
3. See Manual
4. 10/100 Base T
5. FTT10
6. KNX/EIB TP1

Environment

- Operating temperature: -40 to 75°C (-40 to 167°F)
- Relative humidity: 5-90% RH non-condensing

Power Requirements

- 9-30 VDC or 12-24 VAC
- Current draw @ 12V
  - FS-QS-1010, FS-QS-12X0: 150 mA
  - FS-QS-1011, FS-QS-12X1: 279 mA

Physical Dimensions (HxWxD)

- 4.5 x 2.9 x 1.6 in. (11.5 x 7.4 x 4.1 cm)
- 0.4 lbs (0.2 Kg)

Other

- Configuration/Diagnostic utilities
- Capacity: 250 points FS-QS-11XX(500 points FS-QS-12XX)
- Table, Wall or DIN rail mount

Communication

- Baud: 4800, 9600, 19200, 38400, 57600, 115200
- Start Bit: 7, 8
- Stop Bit: 1, 2
- Parity: Even, Odd, None

Approvals

- TUV approved to UL 916 and CSA C22.2 standards
- BTL Mark
- LonMark Certified (FS-QS-1011 and FS-QS-12X1)
- RoHS Compliant
- GOST-R Certified
- CE and FCC

LonMark Certification on the QuickServer FS-QS-1XX1-XXX

- SPID: 80:00:95:46:00:84:04:01
- Profiles:
  - 0000 - Node object (1)
  - 0001 - Open Loop Sensor Object (5)
  - 0003 - Open Loop Actuator Object (5)

Ordering Information

QuickServer is available in multiple driver configurations. Check the website (www.fieldserver.com/QuickServer/) for specific part numbers.

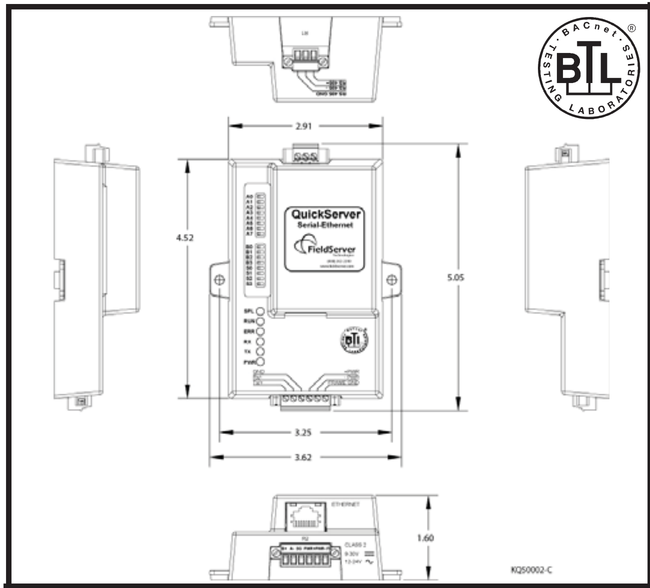
Model	- QuickServer	- Model	- 2nd Serial Port*	- LonWorks	- Protocols
FS-QS	- 1 = QuickServer	- 0 = BAS	- 1 = RS-485	- 0 = None	- 4 digit protocol code
		- 2 = Enhanced	- 2 = RS-232	- 1 = LonWorks	
			- 3 = RS-422		
			- 4 = KNX		

* RS-232/RS-422 / KNX FS-QS-12XX only

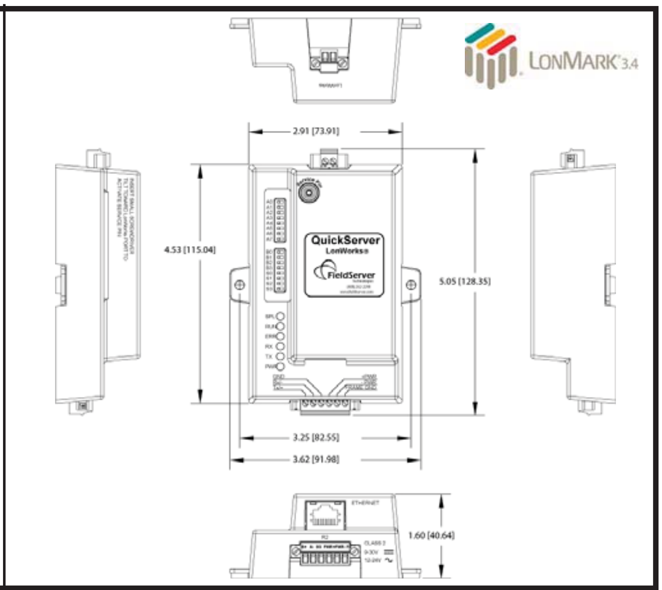
Options

FS-8915-36-QS Accessory Kit, 110/220V

The Accessory Kit consists of a temporary power supply, Ethernet cable, Screwdriver, DIN Rail Mount, and USB flash drive of all manuals, data sheets, Discovery tool and ENotes.



Serial-Ethernet Dimensions



Serial-Ethernet-LonWorks Dimensions

4/2013

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RPP

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Remote Power Panel



RPP



Side view



Front view

Rack RPP

The Eaton Remote Power Panel (RPP) provides big power in a choice of two cabinet sizes; standard or rack depth. The small footprint of the standard RPP is perfect for space cramped facilities or an end-of-row distribution solution. The Rack RPP provides seamless integration into data center white space by matching standard IT rack dimensions. The expanded dimensions of the Rack RPP allow for even easier installation with improved wiring and service space. Either RPP can be configured with up to four high-density panelboards (400A Main Breaker), providing 168 poles of power distribution in a free standing structure. Loaded with Eaton's advanced Energy Management System (EMS) understanding your facilities power distribution and characteristics has never been easier.

Easy Service and Startup

Reduce installation time and save on startup costs

- Backed by Eaton's extensive network of over 240 field technicans for fast reliable service
- Ample cabling space between panelboards (up to five inches)
- Standard top and bottom cable access for more flexible installation options
- Easily removable side and rear covers with captive hardware

Monitoring and Connectivity

To understand your power profile

- Eaton's Energy Management System (EMS) provides state-of-the-art monitoring and alarming provisions
- Stores load profiling for up to 24 months
- PXGX PDP communication card allows for daisy chaining multiple RPPs together, reducing individual network drops to your power equipment
- Monitor the RPP from any computer without software through the integrated web interface, or easily integrate into existing building management systems or Eaton's Power Xpert Software
- Up to 100A branch breaker CTs available
- **Auxiliary contact in panel main breaker to interface with third-party monitoring**

Safety

Protecting employees, contractors and service personnel

- Protective trim panels cover panelboard wiring from accidental contact
- Separation between High/Control voltage sections for safer servicing
- **Shunt trip in panel main breakers**

Aesthetics and Flexibility

Providing the right form-factor for any application

- Clean professional appearance in facilities and data centers
- Rack RPP is designed to integrate directly with IT racks in the white space
- Available see through doors
- Panel board location flexibility (single panel selection either on top or bottom)
- Rack style (mesh) door available on Rack RPP

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TECHNICAL SPECIFICATIONS[1]

Category	RPP	Rack RPP
DIMENSIONS		
Main Cabinet	24"W x 24"D x 80"H	24"W x 42 "D x 80"H
ELECTRICAL CHARACTERISTICS		
Input / Output	208/120V - 3 Phase, 4 Wire + Ground **480V - 3 Phase, 4 Wire + Ground**	
Input Ratings	450 / 300A	
Input Type	Single Feed into Main Lug (up to 4) Dual Feed into Main Lugs (up to 4) Direct Connection to panelboard main breaker	
Frequency	60 Hz	
Neutral Rating	200%	
POWER DISTRIBUTION		
Panelboards	Up to (4) 42 pole Panels (2) Panels in Front & (2) in Rear	
Panelboard Options	Cutler-Hammer (Bolt-on or Plug-in) or SquareD Panels (225A & 400A Main Breakers) 80% or 100% rated	
Branch Breakers	Factory installed branch circuit breakers[2]	
STANDARDS		
	NEMA, UL 60950, CSA 60950	

1. Due to continuing improvements, specifications are subject to change without notice.
2. Please see sales configurator for additional information.
3. Branch breaker schedule required at time of order.
4. When using optional PRL3 chassis, a maximum of (8) 225A Frame breakers can be installed.



RPP



Rack RPP, side view

Options

- Energy Management System
- High kAIC Panel main breakers
- **100% Rated Sub-Feed breakers (CH)**
- **100% Rated Panel Main breakers (CH)**
- Branch Circuit Monitoring
- Floor Stands - Seismic rated (12", 18", 24", 30", 36" & 48")
- Isolated Ground *(Standard)*
- Distribution Cables (whips)
- Clear Plexiglas Doors
- Isolation Barrier for dual feed input and direct connect
- Top or Bottom Panelboard installation
- Extra knock-out, incoming and conduit plates
- Transient suppression plate
- Surge Protection Device (100 or 200kA)
- Low Voltage Control Junction Box
- Mesh Rack doors
- 4 Building Alarm Inputs (N/O or N/C)

**** Options in bold are new additions***

Energy Management System

Monitored Parameters

- Input Voltage (L-L & L-N)
- Input Current (A,B & C Phases)
- Output Voltage (L-L & L-N)
- Output Current (A,B & C Phases)
- Output Neutral Current
- System Ground Current
- kVA, kW, Hz
- Monthly, Yearly, Total kWH
- Output Voltage THD (All Phases)
- Power Factor (Lead/Lag Indicator)
- Output Current % (A, B & C Phases)

Load Profiling

Captures highest and lowest reading on monthly basis with trend information over the last 24 months

- Input/Output Voltage
- Input/Output Current
- Input/Output Frequency
- Input/Output Power Factor
- Input/Output kVA
- Input/Output Voltage THD
- Ground Current
- Neutral Current

Warnings/Alarms

- Input/Output over- & under-voltage
- Input/Output over- & under-frequency
- Input/Output phase rotation
- Input/Output voltage THD
- Input/Output current THD
- Output Overload (3 Levels)
- Building Alarms (4 programmable)
- Summary Alarm
- Communication Fault

Connectivity

- Modbus RTU (RS232/485)
- PXGX PDP (Modbus TCP/IP, SNMP, Ethernet)

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CANADA
Ontario: 416.798.0112
Toll free: 1.800.461.9166

LATIN AMERICA
South Cone: 54.11.4124.4000
Brazil: 55.11.3616.8500
Andean & Caribbean: 1.949.452.9610
Mexico & Central America: 52.55.9000.5252

EUROPE/MIDDLE EAST/AFRICA
Denmark: 45.3686.7910
Finland: 358.94.52.661
France: 33.1.6012.7400
Germany: 49.0.7841.604.0
Italy: 39.02.66.04.05.40
Norway: 47.23.03.65.50
Portugal: 55.11.3616.8500
Sweden: 46.8.598.940.00
United Kingdom: 44.1753.608.700

ASIA PACIFIC
Australia: 61.2.9693.9366
New Zealand: 64.0.3.343.3314
China: 86.21.6361.5599
HK/Korea/Taiwan: 852.2745.6682
India: 91.11.4223.2300
Singapore/SEA: 65.6825.1668

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RPP02FXA
October 2011

Powering Business Worldwide

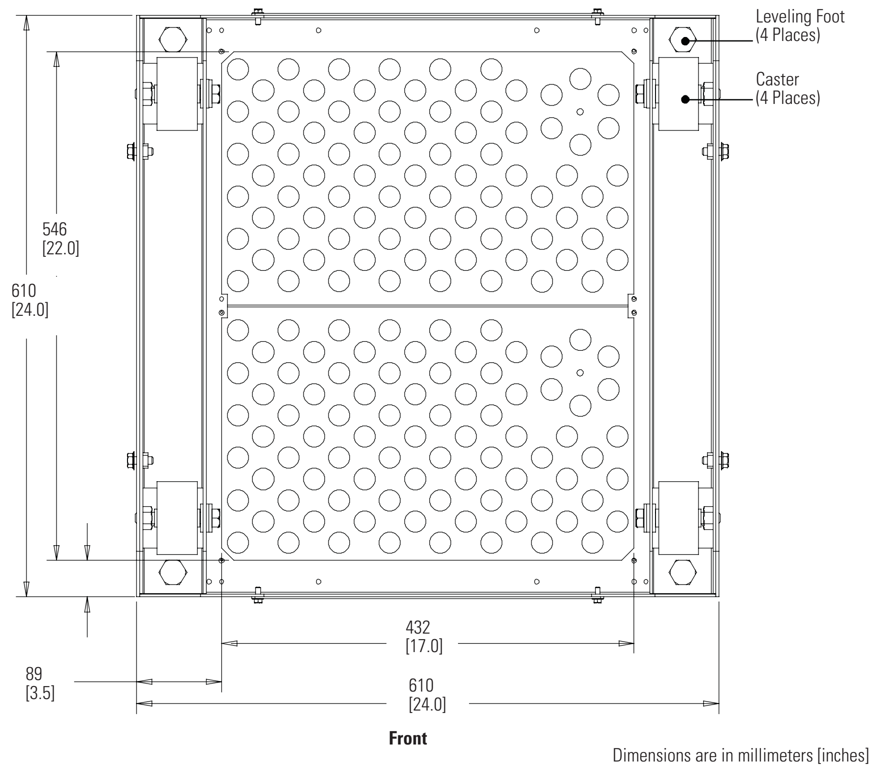


Figure 2. Small RPP Bottom View

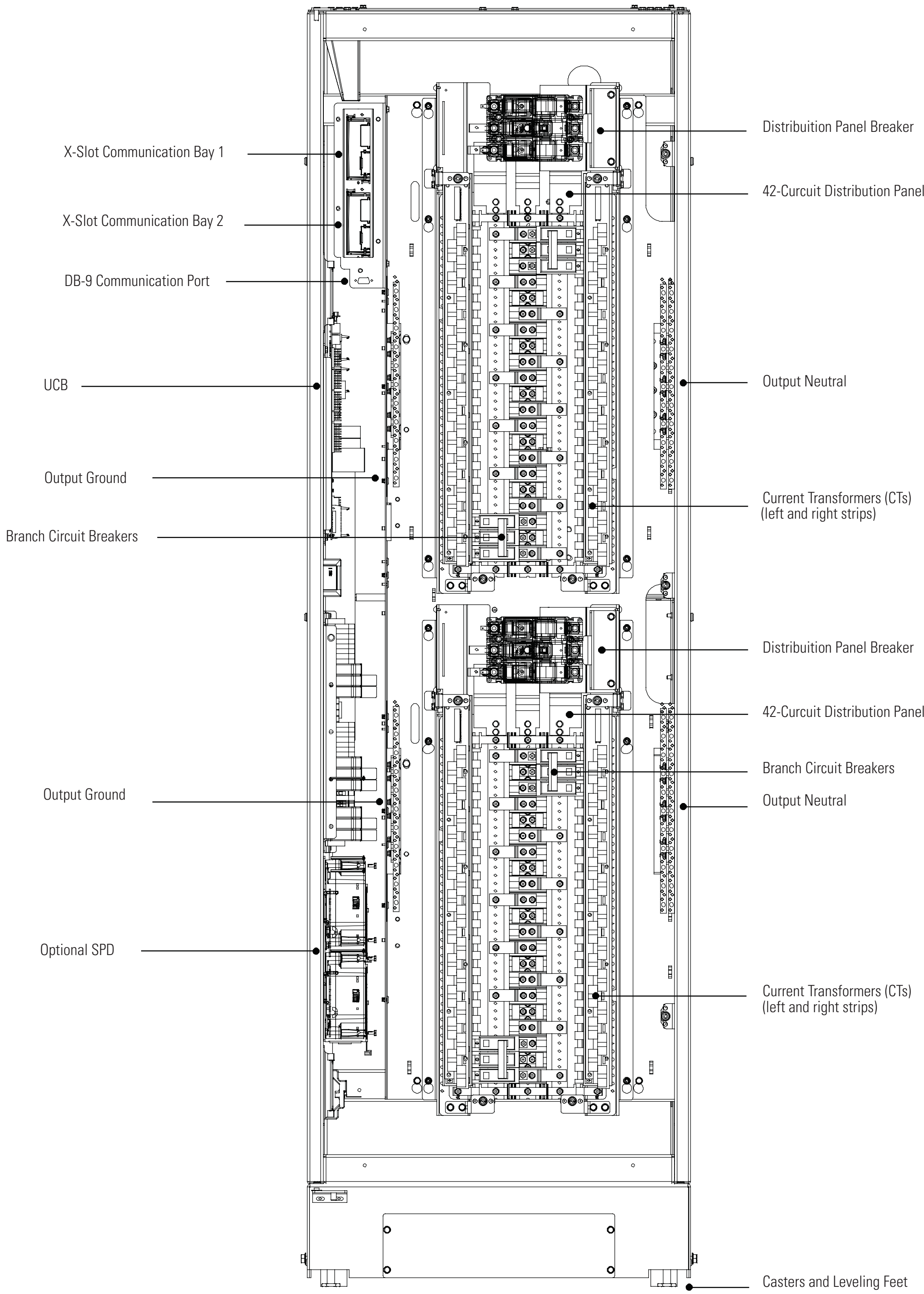


Figure 5. RPP Layout

Table 1. RPP Main Input Feed Conductor Coding and Termination (208V and 400V)

Configuration and Terminal Functions	Panel Main Breaker or Switch Rating	Terminal	Function	Size of Pressure Termination	Tightening Torque Nm (lb in)
Direct Connection to Panelboard Main Breakers	225AF	A (Black)	Phase A	1 – #6–500MCM	56 (500)
		B (Red)	Phase B	1 – #6–500MCM	56 (500)
		C (Blue)	Phase C	1 – #6–500MCM	56 (500)
		N (White)	Neutral	2 – #6–300MCM	31 (275)
		G (Green)	Ground	1 – #14–1/0	5.6 (50)
Direct Connection to Panelboard Main Breakers	400AF	A (Black)	Phase A	2 – #6–500MCM	56 (500)
		B (Red)	Phase B	2 – #6–500MCM	56 (500)
		C (Blue)	Phase C	2 – #6–500MCM	56 (500)
		N (White)	Neutral	4 – #6–300MCM	31 (275)
		G (Green)	Ground	1 – #14–1/0	5.6 (50)
One Panelboard Single MLO Dual MLO	225AF	A (Black)	Phase A	4 – #6–300MCM	31 (275)
		B (Red)	Phase B	4 – #6–300MCM	31 (275)
		C (Blue)	Phase C	4 – #6–300MCM	31 (275)
		N (White)	Neutral	2 – #6–300MCM	56 (500)
		G (Green)	Ground	2 – #14–1/0	5.6 (50)
Two Panelboards Single MLO Dual MLO	225AF	A (Black)	Phase A	4 – #6–300MCM	31 (275)
		B (Red)	Phase B	4 – #6–300MCM	31 (275)
		C (Blue)	Phase C	4 – #6–300MCM	31 (275)
		N (White)	Neutral	4 – #2–600MCM	56 (500)
		G (Green)	Ground	2 – #14–1/0	5.6 (50)
One Panelboard Single MLO Dual MLO	400AF	A (Black)	Phase A	4 – #6–300MCM	31 (275)
		B (Red)	Phase B	4 – #6–300MCM	31 (275)
		C (Blue)	Phase C	4 – #6–300MCM	31 (275)
		N (White)	Neutral	4 – #2–600MCM	56 (500)
		G (Green)	Ground	2 – #14–1/0	5.6 (50)
Two Panelboards Single MLO Dual MLO	400AF	A (Black)	Phase A	4 – #6–300MCM	31 (275)
		B (Red)	Phase B	4 – #6–300MCM	31 (275)
		C (Blue)	Phase C	4 – #6–300MCM	31 (275)
		N (White)	Neutral	6– #2–600MCM	56 (500)
		G (Green)	Ground	2 – #14–1/0	5.6 (50)
Three Panelboards Single MLO	225AF	A (Black)	Phase A	4 – #6–300MCM	31 (275)
		B (Red)	Phase B	4 – #6–300MCM	31 (275)
		C (Blue)	Phase C	4 – #6–300MCM	31 (275)
		N (White)	Neutral	6 – #2–600MCM	56 (500)
		G (Green)	Ground	2 – #14–1/0	5.6 (50)
Four Panelboards Single MLO	225AF	A (Black)	Phase A	4 – #6–300MCM	31 (275)
		B (Red)	Phase B	4 – #6–300MCM	31 (275)
		C (Blue)	Phase C	4 – #6–300MCM	31 (275)
		N (White)	Neutral	6 – #2–600MCM	56 (500)
		G (Green)	Ground	2 – #14–1/0	5.6 (50)
Isolated Ground (if applicable)	All	G (Green)	Isolated Ground	1 – #6–300MCM	31 (275)

Table 2. Conductor Sizing Load Rating (80% Rated Breakers)

Panel Configuration	Panelboard Current and Voltage Rating	Load Rating	Main Breaker Maximum Input Current	Feeder Breaker	Conductor	Wire Size CSA (AWG) (See NOTE)	Number of Conductors
Direct Connection to Panelboard Main Breakers	225A 208V 400V	80%	180A	225A	Phase A, B, C	85mm^2 (3/0)	1
					Neutral	85mm^2 (3/0)	2
					Ground	21mm^2 (#4)	1
Direct Connection to Panelboard Main Breakers	400A 208V	80%	320A	400A	Phase A, B, C	85mm^2 (3/0)	2
					Neutral	85mm^2 (3/0)	4
					Ground	27mm^2 (#3)	1
One Panelboard Single MLO Dual MLO	225A 208V 400V	80%	180A	225A	Phase A, B, C	85mm^2 (3/0)	1
					Neutral	85mm^2 (3/0)	2
					Ground	21mm^2 (#4)	1
Two Panelboards Single MLO Dual MLO	225A 208V 400V	80%	180A	450A	Phase A, B, C	85mm^2 (3/0)	2
					Neutral	85mm^2 (3/0)	4
					Ground	34mm^2 (1/0	1
One Panelboard Single MLO Dual MLO	400A 208V	80%	320A	400A	Phase A, B, C	85mm^2 (3/0)	2
					Neutral	85mm^2 (3/0)	4
					Ground	27mm^2 (#3)	1
Two Panelboards Single MLO Dual MLO	400A 208V	80%	320A	800A	Phase A, B, C	85mm^2 (3/0)	4
					Neutral	126mm^2 (250)	6
					Ground	54mm^2 (1/0	1
Three Panelboards Single MLO	225A 208V 400V	80%	180A	700A	Phase A, B, C	85mm^2 (3/0)	3
					Neutral	85mm^2 (3/0)	6
					Ground	54mm^2 (1/0	1
Four Panelboards Single MLO	225A 208V 400V	80%	180A	900A	Phase A, B, C	85mm^2 (3/0)	4
					Neutral	126mm^2 (250)	6
					Ground	34mm^2 (1/0)	2

NOTE: Wire sizes are based on NEC 2008 Table 310.16 using 90° copper conductors.

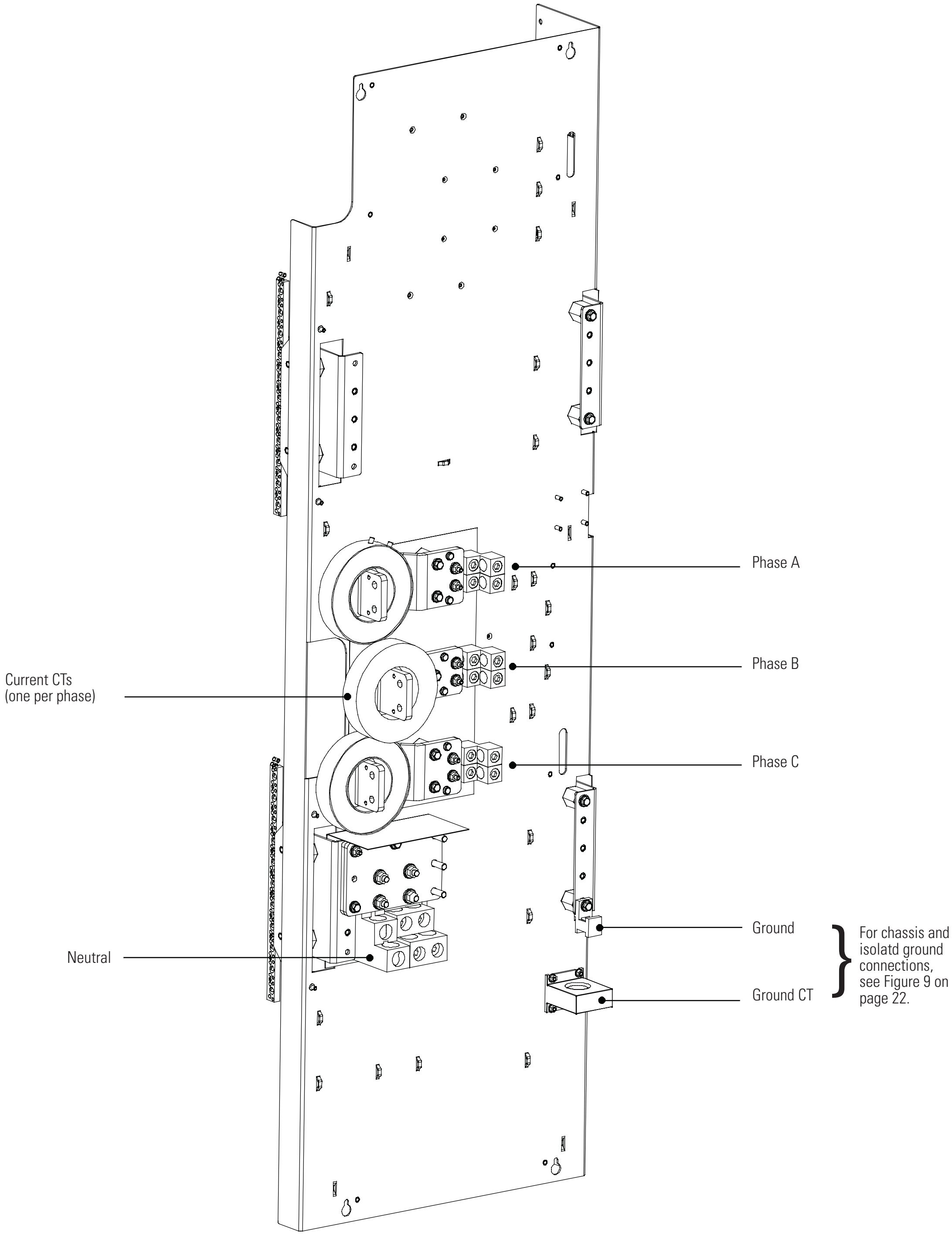
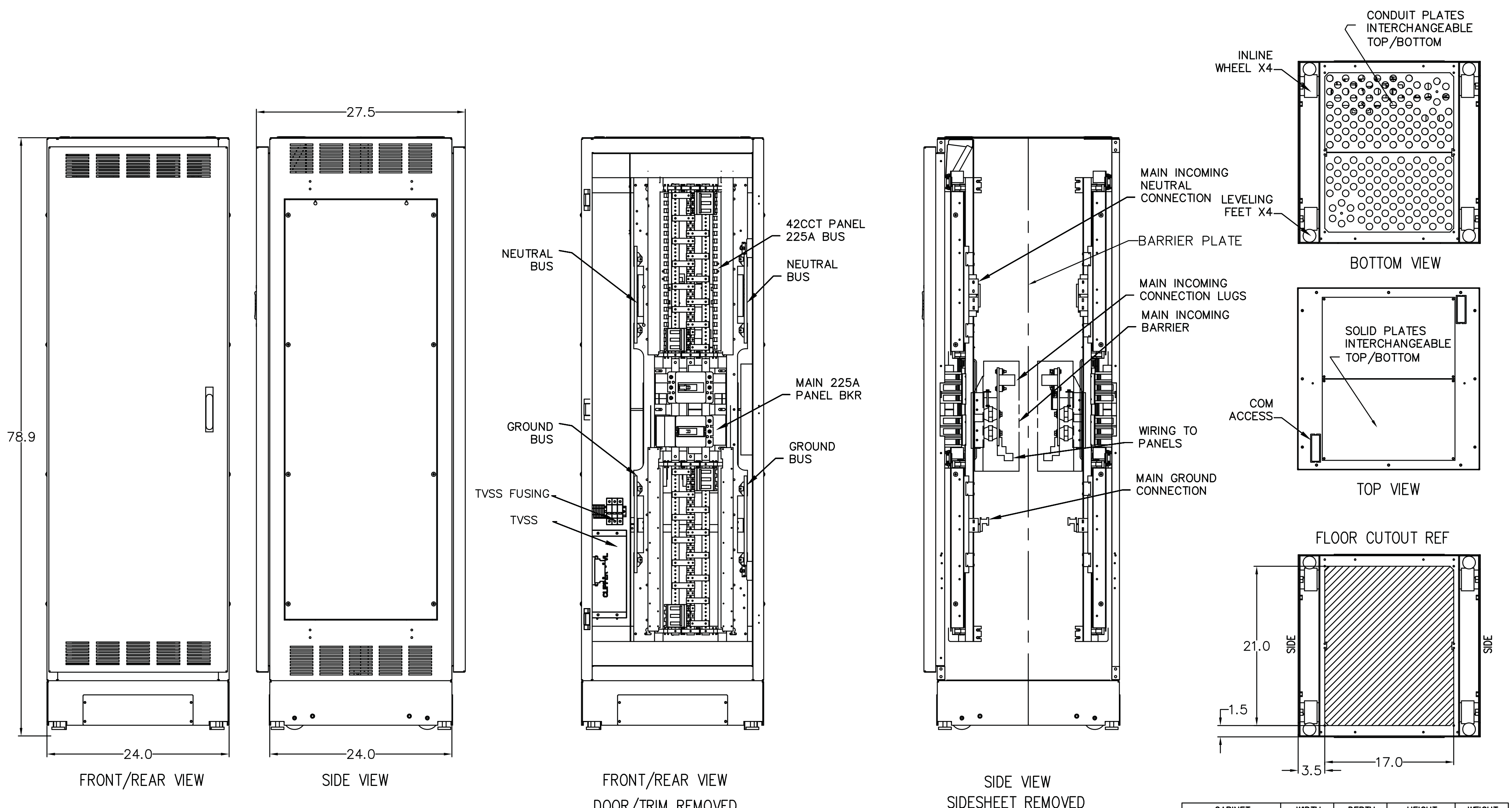


Figure 7. Wiring the Input Connections (each side) for Single or Dual MLO RPP



	CABINET	WIDTH	DEPTH	HEIGHT	WEIGHT
	TYPE	IN/MM	IN/MM	IN/MM	LBS/KG
X	RPP-FRONT ONLY	24/610	24/610	78.9/2004	524/237
	RPP-BACK/FRONT	24/610	24/610	78.9/2004	673/304

01 REVISION

Issued For Construction
The information on this document is suitable for use in establishing final installation and construction details.

THE INFORMATION ON THIS DOCUMENT IS CREATED BY EATON POWERWARE. IT IS DISCLOSED IN CONFIDENCE AND IS ONLY TO BE USED FOR THE PURPOSE IN WHICH IT IS SUPPLIED.

DFTR MH	DATE 05/10/07	POWERWARE	MILTON, ON
APPD .	DATE .	TITLE POWERWARE DATA CENTER SOLUTIONS RPP LAYOUT	
TAG		TYPE RPP	
FEDERAL ID NO.	PRODUCT CODE PG 170	REVISION 1	DWG SIZE
G.O.	DWG CE72523	SHEET 3 OF 3	

WARRANTY & SERVICE COVERAGE

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"Warranty" document covers year 1 service for UPS, PDU, & RPP products.

WARRANTY

Limited Factory Warranty For Eaton Three-phase UPS Products

THREE-PHASE PRODUCTS

WARRANTOR: The warrantor for the limited warranties set forth herein is Eaton Corporation, an Ohio Corporation ("Eaton").

LIMITED WARRANTY: This limited warranty (this "Warranty") applies only to the original End-user (the "End-user") of the Eaton three-phase UPS Products (the "Product") and cannot be transferred. This Warranty applies even in the event that the Product is initially sold by Eaton for resale to an End-user.

LIMITED WARRANTY PERIOD: The period covered by this Warranty for Product installed [and currently located] in the fifty (50) United States and the District of Columbia is twelve (12) months from the date of Product startup or eighteen (18) months from date of Product shipment, whichever occurs first, for parts coverage and 90 days from the date of Product startup for labor coverage. The period covered by this Warranty for Product installed [and currently located] outside of the fifty (50) United States and the District of Columbia is twelve (12) months from the date of Product startup or eighteen (18) months from date of Product shipment, whichever occurs first, for parts coverage.

WHAT THIS LIMITED WARRANTY COVERS: The warrantor warrants that the Eaton three-phase UPS electronics, Eaton-built accessories, and Eaton-built battery cabinets, (individually and collectively, the "Warranted Items") are free from defects in material and workmanship. If, in the opinion of Eaton, a Warranted Item is defective and the defect is within the terms of this Warranty, Eaton's sole obligation will be to repair or replace such defective item (including by providing service, parts and labor, as applicable), at the option of Eaton. The Warranted Item will be repaired or replaced onsite at the End-user's location or such other location as determined by Eaton. Any parts that are replaced may be new or reconditioned. All parts replaced by Eaton shall become the property of Eaton.

WHAT THIS LIMITED WARRANTY DOES NOT COVER: This Warranty does not cover any defects or damages caused by: (a) failure to properly store the Product before installation, including the "trickle charge" of batteries no later than the date indicated on the packaging; (b) shipping and delivery of the Product if shipping is FOB Factory; (c) neglect, accident, fire, flood, lightning, vandalism, acts of God, Customer's neglect, abuse, misuse, misapplication, incorrect installation; (d) repair or alteration, not authorized in writing by Eaton personnel or performed by an authorized Eaton Customer Service Engineer or Agent; or (e) improper testing, operation, maintenance, adjustment or any modification of any kind not authorized in writing by Eaton personnel or performed by an authorized Eaton Customer Service Engineer or Agent.

This Warranty is not valid: (a) unless an authorized Eaton Customer Service Engineer (in USA) or Agent (outside of USA) performs startup and commissioning of the Product; (b) if the Product is moved to a new location by someone other than an authorized Eaton Customer Service Engineer (in USA) or Agent (outside of USA); or (c) if the Product's serial numbers have been removed or are illegible. Any Warranted Items repaired or replaced pursuant to this Warranty will be warranted for the remaining portion of the original Warranty subject to all the terms thereof. Labor warranty is not provided for Product located outside of the fifty (50) United States or the District of Columbia. Any equipment, parts or materials included in the Product and not manufactured by Eaton are warranted solely by the manufacturer of such equipment, parts or materials and are not included as part of this warranty. Batteries are not warranted by Eaton.

THIS WARRANTY IS THE END-USER'S SOLE REMEDY AND IS EXPRESSLY IN LIEU OF, AND THERE ARE NO OTHER, EXPRESSED OR IMPLIED GUARANTEES OR WARRANTIES (INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED).

LIMITATION OF LIABILITY: In no event shall Eaton be liable for any indirect, incidental, special or consequential damages of any kind or type whatsoever, or based on any claim or cause of action, however denominated. Eaton shall not be responsible for failure to provide service or parts due to causes beyond Eaton's reasonable control. In no case will Eaton's liability under this Warranty exceed the replacement value of the Warranted Items.

END-USER'S OBLIGATIONS: In order to receive the benefits of this Warranty, the End-user must use the Product in a normal way; follow the Product's operators and maintenance manual; and protect against further damage to the Product if there is a covered defect.

OTHER LIMITATIONS: Eaton's obligations under this Warranty are expressly conditioned upon receipt by Eaton of all payments due to it (including interest charges, if any). During such time as Eaton has not received payment of any amount due to it for the Product, in accordance with the contract terms under which the Product is sold, Eaton shall have no obligation under this Warranty. Also during such time, the period of this Warranty shall continue to run and the expiration of this Warranty shall not be extended upon payment of any overdue or unpaid amounts.

COSTS NOT RELATED TO WARRANTY: The End-user shall be invoiced for, and shall pay for, all services not expressly provided for by the terms of this Warranty, including without limitation, site calls involving an inspection that determines no corrective maintenance is required. Any costs for replacement equipment, installation, materials, freight charges, travel expenses or labor of Eaton representatives outside the terms of this Warranty will be borne by the End-user.

OBTAINING WARRANTY SERVICE: In the USA, call the Eaton Customer Reliability Center 7x24 at 800.843.9433. Outside of the USA, call your local Eaton sales or service representative, or call the Eaton Customer Reliability Center in the USA at 919.870.3028. For comment or questions about this Limited Factory Warranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, North Carolina 27616 USA.

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"Flex Service Plan" applies to year 2 coverage of UPS products.

Powering Business Worldwide

Eaton UPS Flex Service Plan
Parts and Labor Coverage
Scope of Work
Attachment R-30

This scope of work is shared by the power quality equipment types listed in the below table. Note the applicable features vary by type of equipment being contracted and additional scopes of work may be required. All checks or processes may not be applicable to all equipment types or models.

Equipment Type	Corrective Maintenance Coverage	Electronics Preventive Maintenance	Battery Preventive Maintenance	eNotify Remote Monitoring	Tech Support	Discounts
Eaton UPS	Yes	No	No	No	Yes	No
Eaton PDU/PDR/RPP/STS	Yes	No	No	No	Yes	No
Flywheel	Yes	No	No	No	Yes	No
Non Eaton equipment (MVS)	Yes	No	No	No	Yes	No

If optionally purchased by Customer within the first three (3) years of a Eaton® UPS installation date (first startup) OR,

If optionally purchased by Customer in conjunction with one or more annual on-site UPS Power Module Preventive Maintenance R-2 of the same duration, Contractor will provide:

1. **Corrective Maintenance Coverage:** Inspection and repair of the electronic portion of the UPS (or other equipment type), or “Power Module” shall be performed as needed during the contracted period of maintenance at no extra charge to Purchaser. Remedial maintenance provided by Contractor shall include, and be expressly limited to, maintenance to the Power Module, travel expenses, all necessary parts replacement, adjustments and repairs. If the Purchaser maintains Eaton spare parts at the maintenance site, Contractor may, at its option, use those spare parts in the performance of Corrective Maintenance. Contractor shall replace the spare parts, which it so uses. **Exclusions:** certain wear parts are excluded from corrective coverage including external batteries and full capacitor replacement. All Corrective Maintenance to Battery System, if any, will be in accordance with battery manufacturers’ warranty or separate agreement, if any. For Flywheel coverage: any failure due to lack of recommended bearing replacement, vacuum pump replacement (or “major maintenance” per manufacturer recommendation) will not be included under corrective maintenance coverage and will be billable at current time and material rates.

2. **7x24 Technical Support:** technical support via telephone or email to Contractor shall be available to answer product or support questions.

3. **Customer Web Account Access:** Contractor will provide Purchaser with web-based access to account information and site service records. Access will be password restricted for maximum security of Purchaser records. A history of service performed, as well as scheduled service calls will be available.

The Purchaser shall, from the commencement date of the Service Agreement, maintain the UPS Power Module in accordance with the published operating specifications for the Power Module at the time of purchase. The Purchaser shall, unless otherwise specified in the Service Agreement, maintain the Battery System in strict accordance with the Battery System manufacturer's recommended maintenance guidelines.

Publication No. US-VRLA3-WS-003 September 2009

EnerSys
Power/Full Solutions

PRODUCT WARRANTY

DataSafe™ HX, HX-FT

LEAD ACID STATIONARY BATTERIES
VALVE REGULATED LEAD ACID UPS CYCLE SERVICE

General Product Limited Warranty

EnerSys Delaware Inc. ("EnerSys") warrants its DataSafe™ HX and HX-FT valve regulated lead acid (VRLA) UPS cycle service batteries, racks and cabinets against defective materials and workmanship for the full period as defined in Table A or Table B set forth below, from the date the battery is placed in service or the full period plus six months from the date of shipment, whichever occurs first.

A. If initial physical inspection identifies flaws in material or workmanship that would impair life of the battery, as defined by this warranty, or product performance, as defined by the EnerSys electrical and physical specification as published at the time of shipment and these flaws are not due to transportation damage or installation abuse;

OR

B. If on initial "Acceptance Test", as defined in IEEE Std. 1188, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve Regulated Lead Acid (VRLA) Batteries for Stationary Applications", the properly installed battery string fails to meet the published performance ratings* per the latest catalog data published by EnerSys at the time of shipment.

In the event of either A or B above, then contact your nearest EnerSys sales representative to request instructions. You will be instructed either a) to return the equipment to an EnerSys factory or service center location, FOB Destination-Freight Prepaid, for examination, or b) to wait until an EnerSys representative arrives at the site to inspect the equipment.

If EnerSys determines the battery, rack or cabinet is physically or electrically unsound due to defective materials or workmanship on the part of EnerSys, the defective cell(s) or rack component(s) will be repaired or replaced at the option of EnerSys without charge to the purchaser (user) for replacement materials or repair labor. However, costs of replacement installation, including but not limited to, equipment, travel expenses of EnerSys representatives(s), and costs of material transportation expenses shall be borne by the purchaser (user). The replacement battery shall only complete the remaining unused portion of the original warranty of the replaced battery.

The battery is warranted to have a float or cycle life, whichever occurs first, from the date of shipment, as stated below, and based on conditions stipulated in the installation/maintenance instructions.

TABLE A – FLOAT SERVICE LIFE WARRANTY

Type	Full Warranty Period	Pro Rata Period
HX	3 years	7 years
HX-FT	3 years	7 years

TABLE B - WARRANTED CYCLE LIFE

Discharge Rate	Discharge** Duration	Maximum Cycle Life HX
30 min.	30 min.	100
15 min.	15 min.	120
10 min.	10 min.	140
5 min.	5 min.	180

**Discharge cycles are based on an end voltage of 1.67 Vpc.

**Published performance ratings. Initial capacity shall be a minimum of 100% of the rated string capacity (kWb) upon shipment per IEEE-1188.*

(over)

BATTERY OPERATING TEMPERATURES	
Annual average battery temperature	Any cell temperature not to exceed for more than 30 days per year
77°F (25°C)	89°F (32°C)

Normal battery float/cycle life may be expected only when the battery is operated under the aforementioned temperature conditions. If operation of the battery is not within these parameters, the battery warranty shall be null and void.

Useful service life is considered to have expired when the battery fails to deliver 80% of its rated string capacity. The rated string capacity is that which is published in EnerSys catalog literature at the time of shipment. The determination of actual capacity shall be made in accordance with the "performance test" guidelines of IEEE Std. 1188. If the battery is maintained per the installation/maintenance instructions and other recommendations contained in this document and fails to deliver 80% of its rated string capacity, EnerSys shall credit the purchaser (user) toward the purchase of a new EnerSys battery of equal or greater amp-hour capacity.

Either the cycle or float service warranty will be used to determine warranty credit. The type of duty that shows the most use will be the governing factor.

Cycle Credit – Cycle credit is determined on battery usage. An approved cycle monitor must be used in order to obtain the cycle warranty. Cycle credit is determined as follows: (Refer to Table B)

$$\%\ \text{cycle credit} = 1 - \left(\frac{\#\text{ of 30 min cycles}}{20\ \text{cycles}} + \frac{\#\text{ of 15 min cycles}}{25\ \text{cycles}} + \frac{\#\text{ of 10 min cycles}}{32\ \text{cycles}} + \frac{\#\text{ of 5 min cycles}}{38\ \text{cycles}} \right) \times 100$$

Float Credit – Float service is determined from the install date or six months after shipment, whichever occurs first. Table A will be used to determine float credit.

$$\text{Credit (\$)} = \text{Original Net Price} \times \left(1 - \frac{\text{Months of Expired Life}}{\text{Months of Warranted Life}} \right)$$

Example: A 40 month old DataSafe™ HX battery has been cycled as follows:

Qty. 3 cycles between 15 to 30 minutes
Qty. 5 cycles between 10 and 15 minutes
Qty. 0 cycles between 5 and 10 minutes
Qty. 5 cycles between 0 and 5 minutes

$$\text{Cycle credit} = 1.00 - \left(\frac{3}{20} + \frac{5}{25} + \frac{0}{32} + \frac{5}{38} \right) = (1.00 - .48) \times 100 = 52\%\ \text{credit}$$

$$\text{Float credit} = 1 - \frac{40}{120} \times 100\% = 67\%\ \text{credit}$$

Result = Cycle Credit of 52% applies

EXCLUSIONS AND LIMITATIONS

1. The purchaser (user) shall give freshening charges to the battery a minimum of every three (3) months for Lead-Antimony and every six (6) months for Lead-Calcium after shipment from the factory and until final installation. Refer to the installation and maintenance instructions for maximum storage intervals.
2. At least once every twelve (12) months, purchaser (user) must take readings and record information per the EnerSys installation/maintenance instructions. These records must be maintained for warranty claim purposes. If warranty records are not kept, the warranty shall be null and void.
3. Parallel strings should be limited to five (5) strings, except with an expressed written consent from EnerSys headquarters in Reading, PA.
4. This warranty applies only to the original United States and Canada domestic purchaser (user) and is non-transferable internationally, except with the expressed written consent from EnerSys headquarters in Reading, PA.
5. This warranty does not cover physical damage due to the acts of nature or man which stress the battery beyond design limits and exert undesirable influence aside from normal wear and tear.
6. EnerSys assumes no responsibility for any work accomplished or expenses incurred, except with the expressed written consent from EnerSys headquarters in Reading, PA.
7. Movement of batteries from original point of installation shall immediately void this product warranty, except with the expressed written consent from EnerSys headquarters in Reading, PA.
8. Any storage shall be in a dry area having an average ambient temperature of 77ºF (25ºC), or less, and in accordance with EnerSys published installation/maintenance instructions. Failure to follow EnerSys published guidelines and/or instructions may invalidate the product warranty, at the sole discretion of EnerSys.
9. Manufacturer's acceptance of any items shipped to Manufacturer shall not be deemed an admission that the items so shipped are defective. Any items shipped back to Manufacturer, shall in Manufacturer's sole discretion, become Manufacturer's sole property.

THIS LIMITED WARRANTY IS IN LIEU OF, AND MANUFACTURER DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, STATUTORY, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. MANUFACTURER'S EXCLUSIVE LIABILITY FOR BREACH OF WARRANTY SHALL BE TO REPLACE THE BATTERY WITHIN THE EFFECTIVE WARRANTY PERIOD. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR ANY LOSS OR DAMAGES OF ANY OTHER KIND, WHETHER DIRECT, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY, SPECIAL OR OTHERWISE. NOR SHALL MANUFACTURER BE LIABLE FOR ANY REMOVAL OR INSTALLATION EXPENSE, OR THE LOSS OF TIME OR PROFITS.

Some countries and/or states do not allow limitation on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, which may vary from country to country and/or state to state.

____
Signed by EnerSys Delaware Inc. Representative Date

____
Print Name, Title

____
Signed by Purchaser (user) Date

____
Print Name, Title

EnerSys Order # ________________________________

Publication No. US-VRLA3-WS-003 September 2009